Fansteel
Wellman Dynamics

1746 Commerce Rd., Creston, Iowa 50801
641/782-8521 Phone 641/782-7672 Fax

June 13, 2005

Patricia Murrow
ARTD/RCAP
U.S. Environmental Protection Agency
901 North 5th Street
Kansas City, KS 66101

Re: Wellman Dynamics Corporation – RCRA Facility Identification No. IAD065218737
Administrative Order on Consent ("AOC"), EPA Docket No. RCRA-07-2003-0167
Submission of Final Current Conditions Report

Dear Ms. Murrow:

In accordance with Paragraph XIV (4 and 5) of the subject AOC, please find three copies of a response letter prepared by BT^2, Inc., in response to your comments on the Current Conditions Report for Wellman Dynamics Coporation. BT^2's response letter includes three copies of the modified text for the Final Current Conditions Report, as well as modified figures and additional appendix items.

Also in accordance with Paragraph XIV (3 and 4) of the subject AOC, please find the document certification below.

"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. I certify that the information contained in or accompanying this submittal is true, accurate, and complete to the best of my knowledge. As to those identified portions(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based in my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature: _____

Name: David Leitten

Title: President

Date: June 13, 2005

We will continue to submit quarterly progress reports, the next of which is due July 15th. In addition and as described in Section VII (Schedule for Report Submittal) of Attachment 2 (Scope of Work for a RCRA Facility Investigation) of the AOC, we will submit to your attention the RFI Workplan (Task II of Attachment 2 of the AOC) within 60 days of your approval of the Current Conditions Report. Until that time, please feel free to call me (641/782-8521, ext. 206) if you have any questions or if you would like to discuss this further.

Sincerely,

Joe Haller

Joe Haller
Environmental Engineer

Enclosure: Three (3) copies of BT^2 response letter with Final Current Conditions Report text

Cc: Steve Bradley (Wellman Dynamics Corporation)
Dave Leitten (Wellman Dynamics Corporation)
E. Jonathan Jackson (Fansteel, Inc.)
Gary L. Tessitore (Fansteel, Inc.)
Mike McEntee (Fansteel, Inc.)
Sherren Clark, (BT^2, Inc.)

June 15, 2005

Ms. Patricia Murrow
ARTD/RCAP
U. S. Environmental Protection Agency
901 North 5th Street
Kansas City, KS 66101

SUBJECT: Response to Comments on Current Conditions Report for Wellman Dynamics Corporation
RCRA Facility Identification No. IAD065218737
Administrative Order on Consent (AOC)
EPA Docket No. RCRA-07-2003-0167
BT² Project #2631

Dear Ms. Murrow:

BT², Inc., is submitting this letter on behalf of Wellman Dynamics Corporation to provide responses to the comments you provided for the Current Conditions Report (CCR) for this site. The report was submitted on May 20, 2004. Your comments were provided to Wellman Dynamics Corporation in a letter dated May 10, 2005, which was received by Wellman Dynamics Corporation on May 16, 2005. Each of your comments is shown below in bold type followed by our response.

We have enclosed the revised text of the CCR with this letter, along with two revised figures and two additional appendix pages. The specific changes made are described below. The revised pages should be inserted into the binders for the May 2004 report, replacing the previous versions of the text and figures.

1. Page 5, Section 4.3 and Section 4.7: It is unclear if filter cake and wastewater treatment sludge wastes detailed in the text for Solid Waste Management Unit (SWMU) 2 and SWMU 6 are the same wastes. In the event that the waste characterization descriptions are interchangeable the text in the report should explain this. Please review the document for similar details and revise accordingly.

Filter cake and wastewater treatment sludge are the same wastes. The report text has been modified in Section 2.1.4, Section 4.3.1, and Section 4.7.3 to clarify that this waste is generated at the filter press of the wastewater treatment system (SWMU 6) and then stored at the current wastewater treatment sludge storage area (SWMU 2). The filter cake/wastewater treatment sludge waste was formerly stored at the former wastewater treatment sludge storage area (SWMU 1). No other interchangeable terminologies have been identified.

2. Page 10, Section 3.5, Site-Specific Geology and Hydrogeology: The local hydrogeology has not been fully characterized with respect to flow direction and extent of contamination. The need to fully understand the hydrogeology is imperative to completing the RCRA Facility Investigation (RFI). The absence of potentiometric surface maps and hydrogeologic profiles suggests that the monitoring well network should be evaluated thoroughly with respect to understanding contaminant transport and coverage. The Current Conditions Report should emphasize the need for further evaluation of these issues during the next phase of the corrective action process (i.e., RFI).

The flow direction at the site as determined by water table monitoring wells and leachate wells has been documented. Two water table maps which show the site groundwater flow directions to be from northwest to southeast at the site have been added to Appendix C. We agree that further work is necessary with respect to determining potentiometric surfaces, deeper groundwater flow, and extent of groundwater contamination. We have modified the text in Section 3.5 to indicate that further groundwater evaluation will be part of the RFI.

3. Page 10, Section 3.5, paragraph 1, 2nd bullet. Distance from the site to the Middle Platte River is listed as 550 feet, however, other sections, such as 3.1, state that the river is 1000 feet. Please correct this inconsistency throughout the document.

The text in Section 3.1 has been modified to indicate the Middle Platte River is approximately 550 feet southeast of the site. No other occurrences of the reference to 1,000 feet were found.

4. Page 16 and 28, Section 4.3.6 and Section 4.8.6, respectively: The Current Wastewater Treatment Sludge Storage Area (SWMU 2) and the Waste Methanol Drum Storage Area (SWMU 7) are not proposed for further investigation. The proximity of these SWMUs to site soils make them susceptible to releases of hazardous waste and/or hazardous constituents that may migrate to underlying groundwater. The close proximity of the two SWMUs should facilitate soil sampling for status confirmation. The Current Conditions Report must be revised to state that soil sampling will be performed as part of the RFI work plan and in accordance with the standard procedures and protocols.

We have modified the text in Section 4.3.6, Section 4.8.6, and Section 4.16 to propose soil sampling in these areas. We have also added these areas to the exposure pathway discussions in Sections 6.3.5 and 6.3.7 and revised the exposure pathway diagrams on Figures 7 and 11.

5. Page 35 and 36, Section 4.11, SWMU 10, Waste Acid Collection Pit: This section states that the integrity of the waste acid collection pit is unknown, since the concrete pit is located beneath the tanks, is surrounded by a concrete floor, and is also unlined. The section further states that the potential for a release should be re-examined after the integrity of the waste pit is determined or by sampling soil and/or groundwater below or downgradient for the pit. At a minimum, Wellman Dynamics must propose in the RFI work plan sampling of soil and groundwater at and near the pit, and the Current Conditions Report must be revised accordingly.

We have modified the text in Section 4.11.6 and Section 4.16 to propose soil and groundwater sampling in this area.

6. General: The release of acidic materials to the site soils may result in increased concentrations of inorganics in the local groundwater. This should be detailed in the text of the Current Conditions Report and evaluated as part of the forthcoming RFI work plan. The inorganics associated with low pH wastes may not fully represent the extent of contamination. Analysis of total metal concentrations should be undertaken in order to fully assess the impact to the local environment.

We have modified the text in Section 4.12.6 and Section 4.16 to indicate that evaluation of inorganic constituents in groundwater will be a necessary part of the RFI and that specific laboratory analyses will be addressed in the RFI workplan.

7. General: Please provide a list of document acronyms and abbreviations to facilitate a review of the document. Include the location of this list in the Table of Contents.

A list of acronyms and abbreviations was added to the CCR and is referenced in the Table of Contents.

In addition to the changes requested in your letter, we have also made a few minor corrections and added the list of references (Section 8.0), which was inadvertently left out of the May 2004 CCR copies. No other substantive changes have been made to the CCR.

If you have any questions regarding this submittal, please contact us at (608) 224-2830.

Sincerely,
BT^2, Inc.

Sherren Clark, P.E., P.G.
Project Manager

Stephen Sellwood
Project Hydrogeologist

Enclosures: Final CCR text to replace May 2004 version
Revised Figures 7 and 11 to replace May 2004 versions
2 Water Table Maps to be added to Appendix C

cc: Jon Jackson, Fansteel
Joe Haller, Wellman Dynamics Corporation
Steve Bradley, Wellman Dynamics Corporation

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Engineering & Science

Final Current Conditions Report
Wellman Dynamics Corporation
Creston, Iowa
USEPA ID No. IAD065218737

June 2005

Prepared For:

Wellman Dynamics Corporation
1746 Commerce Rd
Creston, Iowa 50801

Prepared By:

BT², Inc.
2830 Dairy Drive
Madison, Wisconsin 53718

Project #2631

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ABBREVIATIONS AND ACRONYMS

amsl	above mean sea level
AOCs	areas of concern
AST	aboveground storage tank
BOD	biological oxygen demand
CCR	Current Conditions Report
CEI	Compliance Evaluation Inspection
CFR	Code of Federal Regulations
City	City of Creston, Iowa
cm	centimeters
cm/s	centimeters/second
CMS	Corrective Measures Study
EPA	United States Environmental Protection Agency
FWD	Fansteel/Wellman Dynamics
geoprobe	Geoprobe™
GES	Green Environmental Services, Inc.
GWQAP	Groundwater Quality Assessment Plan
H.R. Green	Howard R. Green Company
HWMU	hazardous waste management unit
IDNR	Iowa Department of Natural Resources
IDPH	Iowa Department of Public Health
LLMW	Low Level Mixed Waste
M&E	Metcalf & Eddy, Inc.
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
NAPL	non-aqueous phase liquid
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
ORAU	Oak Ridge Associated Universities
Order	Administrative Order on Consent
PCE	tetrachloroethylene
POTW	publicly owned treatment works
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SMCL	Secondary Maximum Contaminant Level
SSLs	Soil Screening Levels
SV	Sampling Visit
SWMUs	solid waste management units
TCLP	Toxicity Characteristic Leaching Procedure
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOCs	volatile organic compounds
VSI	Visual Site Inspection
WDC	Wellman Dynamics Corporation
WHO	World Health Organization

ABBREVIATIONS AND ACRONYMS

µg/kg	micrograms per kilogram
µg/l	micrograms per liter

1.0 INTRODUCTION

1.1 Objectives and Scope

This Current Conditions Report (CCR) has been prepared for the RCRA Facility Investigation (RFI) of the Wellman Dynamics Corporation (WDC) facility. The CCR was prepared in accordance with the requirements of the Administrative Order on Consent (Order) issued by the United States Environmental Protection Agency (USEPA) that became effective on January 23, 2004. The objective of the CCR is to streamline the RFI process by consolidating the previously acquired site data from various sources. This information will be used to focus the scope of the RFI.

The CCR includes the information required under Task I in Attachment 2 to the Order, including the following:

- Facility background information
- Description of the nature and extent of current contamination based on current information, including a preliminary conceptual site risk model
- Documentation of interim measures implemented since the RCRA Facility Assessment (RFA)

1.2 RFI Background

The Order requires WDC to perform an RFI to determine the nature and extent of any release of hazardous wastes and/or hazardous constituents at or from the facility, and if appropriate, perform a Corrective Measures Study (CMS) to identify and evaluate corrective action alternatives necessary to remediate contaminated media to levels protective of human health and the environment. The Order does not include requirements for characterization or corrective action of radiological constituents at the facility currently being addressed by the Iowa Department of Public Health (IDPH). A copy of the Order is included in **Appendix A**.

The Order was issued based on information collected during the RFA and subsequent RCRA compliance evaluations. The RFA was performed by Metcalf & Eddy, Inc. (M&E) on behalf of the USEPA (M&E, 1993). The RFA identified 12 solid waste management units (SWMUs) at the facility.

1.3 Project Information

Facility Name:	Wellman Dynamics Corporation
EPA ID No:	IAD065218737
Facility Address:	1746 Commerce Road Creston, IA 50801
Facility Project Coordinator:	Joe Haller, Environmental Engineer (641) 782-8521, ext. 206 Address above
Corporate Contact:	E. Jonathan Jackson, Environmental and Safety Compliance Director 847-689-4900, ext. 553 Fansteel 1 Tantalum Place North Chicago, IL 60064
Consultant Contact for CCR:	Sherren Clark, P.E., P.G., Project Manager 608-224-2828, ext. 223 BT^2, Inc. 2830 Dairy Drive Madison, WI 53718

2.0 FACILITY BACKGROUND

2.1 Facility Description and History

2.1.1 Location

WDC is located at the northwest corner of the intersection of U.S. Highway 34 and Osage Street in the Creston Industrial Park in Union County, Iowa (**Figure 1**). The facility is located just outside of the City of Creston corporate limits in the Township of Highland, but is served by City water and sewer. The WDC property includes an area of approximately 42 acres. The facility layout is shown on **Figure 2**.

2.1.2 Site Access

The facility is fenced to control access to all operational areas of the property; only the parking lots and front and side lawn areas are outside the fence. In addition, a security guard is on duty 24 hours a day, 7 days a week.

2.1.3 Plant Ownership History

The facility was originally constructed in 1965 as an aluminum and magnesium foundry and has been used for the same purpose since that time. The facility was initially owned by Hills McCanna Corporation of Chicago, Illinois, and then was operated by a variety of owners from 1971 to 1985. In 1985, Beatrice Corporation sold the facility to Fansteel, Inc. WDC is a wholly owned subsidiary of Fansteel, Inc.

2.1.4 Description of Current Operations

WDC manufactures magnesium and aluminum alloy castings primarily for the aerospace industry. Products include complex components for helicopters, missiles, rocket engines, jet engines, and structural parts for both military and commercial aircraft, such as the Bell/Boeing V-22 Tilt Rotor, the Rolls Royce/BMW BR710 jet engine, and the Pratt and Whitney alternate turbopump for the Space Shuttle main engines. Non-aerospace applications have included 1,600-pound magnesium transfer pumps for the oilfield industry and porosity-free castings for computer chip manufacturing. Various magnesium and aluminum alloys are cast to achieve specific final properties.

The facility includes two main buildings and several smaller outbuildings as shown on **Figure 2**. The main production building is approximately 285,000 square feet in area, and houses the administrative offices, foundry, and supporting operations. The second major building is the pattern storage and warehouse building, located north of the main production building. Outbuildings include the following, as shown on **Figure 2**:

- Storage Sheds: Located north of the main building and south of the pattern storage/warehouse building. Includes the following sheds:
    - Chip Storage Shed: Used to store scrap metal chips for recycling.
    - Chill Storage Shed: Used to store extra "chills," which are solid metal parts used in the sand molds for heat transfer as described below.
    - Bottled Gas Storage Shed: Used to store bottled gas including liquid argon, sulfur dioxide, and sulfur hexafluoride.
    - Thorium Shed: Located immediately north of bottled gas storage shed. Used to store new thorium alloy (20% thorium) and waste thorium alloy (4% thorium).
- Effluent Sewer Shed: Located near the southwest corner of the main production building. Houses the meter and sampling port for the discharge to the Creston publicly owned treatment works (POTW).

- Dross Shed: Located between the pattern storage/warehouse building and the northwest corner of the landfill, east of monitoring well MW19. Used to store equipment and scrap metal for recycling.
- Former Leachate Storage Shed: Located northeast of the dross shed. Used to house a leachate storage tank that was formerly used as a water supply for the dross treatment operation. Currently, this tank is not in use and all leachate is pumped to a storage tank at the north end of the main production building.
- Sand Shed: Located adjacent to the east side of the main production building. Used to store the sand truck and equipment that was used in the past to load the sand silos.
- Guard Shack: Located near the east side of the main production building.

Foundry operations are conducted in the main production building. Foundry operations include melting the solid metal, pouring the liquid metal into a mold, and allowing the metal to solidify. The solidified metal part, known as a casting, goes through several cleaning, inspection, and testing steps prior to shipping to the customer. The aluminum and magnesium melting occurs in separate areas of the facility, as shown on **Figure 2**.

Fluxes are added to the magnesium to aid in melting. Fluxes used include magnesium chloride, sodium chloride, potassium chloride, and barium chloride and fluorides. Magnesium dross is skimmed off the top of the large melt pot and ultimately transferred to the magnesium dross treatment area (SWMU 9).

The molds for the castings are created either from "dry sand" or "green sand." Dry sand molds are held together by binders, such as phenolic resins, and form a hard mold. Green sand molds use oil and bentonite clay as the binders to create a softer mold. Metal "chills" are placed in the molds to aid in heat transfer from the molten metal.

When the metal has cooled and hardened, the molds are transferred to the "Knock Out" area, where the sand is mechanically separated from the casting. The chills are recovered for reuse. Most of the sand is reclaimed for reuse. A thermal reclamation unit burns the resins off the dry sand. Sand that cannot be reused is disposed of in the on-site landfill (SWMU 12).

Acids are used to etch the castings, or remove the grinding coating from the casting to reveal imperfections. Acids used in the process include hydrofluoric, nitric, sulfuric, chromic, and acetic acids. Hydrofluoric acid is used on aluminum parts. Nitric, sulfuric, chromic, and acetic acids are used on

magnesium parts. The acid etch area includes five process tanks along with four rinse tanks. The tanks range in total capacity from 1,000 gallons to 1,500 gallons, and are typically approximately 60% full. Any material spilled from these tanks enters a concrete pit located beneath the tanks (SWMU 10).

The waste acids collected in the concrete pit, as well as spent hydrofluoric, nitric, acetic, and sulfuric acids, are transferred to the wastewater treatment system (SWMU 6). The wastewater treatment system consists of two 2,500-gallon plastic batch treatment tanks, a filter press and a hopper to accumulate the wastewater treatment sludge generated by the filter press. The wastewater treatment process includes the addition of sodium metabisulfite to convert hexavalent chromium to trivalent chromium, followed by lime addition to raise the pH and precipitate chromium hydroxide, followed by addition of flocculant and filtration to remove the precipitated metals. The effluent is discharged to the POTW under a pretreatment agreement with the City of Creston. The filter cake (wastewater treatment sludge) from the filter press is stored in a covered 20-cubic yard steel roll-off bulk container (SWMU 2). The wastewater treatment sludge is managed as a hazardous waste (D007) and is shipped to Peoria Disposal Company for disposal

The castings go through several more finishing and inspection steps, including x-ray inspection, Zyglo penetrant oil inspection, vapor degreasing, heat treatment, grinding, and/or welding. Finished products are shipped to the customer. The vapor degreaser uses tetrachloroethylene (PCE) as a solvent. The spent PCE solvent is periodically removed from the degreaser and managed as a hazardous waste (F001). The quantity generated is typically two drums or less and the material is sent off site for disposal. When solvent is added to the degreaser, a small quantity of a water/PCE mixture is generated from cleaning the transfer pump. This material is stored in the warehouse (see **Figure 2**) and shipped off site for disposal within 90 days from the time it is stored.

2.1.5 Facility History and Past Operations

The RFA included a summary of the facility history and operations as well as a listing of the regulatory compliance history for WDC. An update on the current status of each SWMU identified in the RFA is provided in **Section 4.0** of this report. Since the RFA was prepared, significant correspondence or events related to waste management at WDC include the following:

January and February 1998	Voluntary site assessment soil and groundwater sampling performed by WDC for internal evaluation.
September 1, 1998	PCE spill – See **Section 2.2** for details.
February 23, 1999	PCE in vapor degreaser replaced with non-hazardous EnSolv-CW.

Late 2000	Old vapor degreaser replaced with a new enclosed unit that uses PCE and old degreaser pit in plant floor backfilled and covered with concrete.
June 26, 2001	Letter of Warning/Request for Information issued to WDC by USEPA as a follow-up to a RCRA Compliance Evaluation Inspection conducted on August 17-18, 2000.
July 30, 2001	Response to June 26 Letter of Warning/Request for Information submitted to USEPA by WDC.
January 15, 2002	Fansteel Inc. and its U.S. subsidiaries filed voluntary petitions for reorganization relief under Chapter 11 of the United States Bankruptcy Code.
April 10, 2002	Draft Order issued by USEPA.
November 4, 2003	Closure Certification for the former wastewater treatment sludge container storage unit (SWMU 1) issued by USEPA.
December 1, 2003	Notification Claiming a Conditional Exemption under 40 CFR 266.230 for Low Level Mixed Waste (LLMW) Stored at WDC submitted to USEPA by WDC.
January 23, 2004	Plan of reorganization for Fansteel/WDC became effective.
January 30, 2004	Letter from USEPA to Lawrence Schnapf (attorney for WDC) confirmed that the effective date of the Order is January 23, 2004.
February 10, 2004	Notification on Designation of Project Coordinator submitted to USEPA by WDC identified Mr. Joseph E. Haller as WDC's Project Coordinator for implementation of the Order.
February 19, 2004	Notification on Consultant Qualifications submitted to USEPA by WDC indicating that BT^2, Inc. has been selected to complete the CCR and RFI Workplan.

Additional correspondence specific to individual SWMUs is discussed in **Section 4.0**.

The 1998 site assessment sampling included soil and groundwater sampling with a Geoprobe™ (geoprobe) sampler (BT^2, 1998). The samples were analyzed for volatile organic compounds (VOCs) and/or selected metals. The results are discussed in **Section 5.0**.

2.1.6 Other Permits and Approvals

In addition to the RCRA requirements outlined in the Order, WDC is operating under the following additional environmental permits, approvals, or orders:

- National Pollutant Discharge Elimination System (NPDES) Permit No. 88-22-1-01 for stormwater discharges, issued by Iowa Department of Natural Resources (IDNR) on December 12, 2003.
- Title V operating permit No. 99-TV-018-M001 issued by IDNR on June 1, 2001 and renewal application submitted on October 29, 2003.
- Wastewater Treatment Agreements (2) with City of Creston for Non-Ferrous Foundry and Non-Ferrous Foundry Landfill Leachate, effective April 4, 2001.
- Sanitary Disposal Permit No. 88-SDP-04-86P for the on-site landfill, renewed by IDNR on January 21, 2004.
- IDPH Materials License No. 0103-1-88-SM1 for storage and use of radioactive thorium, issued by IDPH on July 9, 1999 with a correction issued on August 5, 1999.

2.2 Spill History

Known or suspected spills were documented in the 1994 RFA. Since that time, the only known product or waste spill was a PCE spill in 1998.

The PCE spill occurred at the PCE aboveground storage tank (AST) on September 1, 1998. About 50 gallons of PCE were spilled onto the underlying concrete pad and surrounding paved parking lot. The spill ran east across the parking lot until it reached a north-south concrete curb, and then followed the curb to the north. The spill was contained on the parking lot. Silica sand was used to contain and absorb the spilled PCE. The sand was placed into 55-gallon drums with lids for disposal. A sample of the sand was collected on September 24, 1998 and tested for toxicity characteristic leaching procedure (TCLP) volatiles. PCE was the only VOC detected in the leachate and the reported concentration of 0.4 milligrams per liter (mg/l) was below the regulatory limit of 0.7 mg/l, so the material was not classified as a hazardous waste.

The USEPA and IDNR were verbally notified of the spill on September 1, 1998. A follow-up written report was submitted to IDNR on September 14, 1998 and a USEPA Chemical Release Questionnaire was completed on January 22, 1999. Copies of these documents along with the analytical results for testing of the sand are included in **Appendix B**.

3.0 SITE AND ENVIRONMENTAL SETTING CHARACTERISTICS

This section describes the characteristics of the site and environment, including land topography and use, climate, geology, soils, hydrology, and hydrogeology. Information in the following subsections was obtained primarily from the RFA (M&E, 1993) and the Hydrogeologic Investigation Report (Green Environmental Services, Inc. (GES), 1993). In accordance with the Order, site setting information is also presented on maps as follows:

- Figure 1 – Site Location Map (USGS topographic quadrangle base)
  - General geographic location
  - Topography and surface drainage

- Figure 2 – Site Plan
  - Property lines
  - Tanks, buildings, utilities, paved areas, and other physical and structural features
  - Easements and rights-of-way held by persons other than WDC
  - Solid or hazardous waste treatment, storage, and disposal areas, including current and past
  - Underground tanks and piping, including current and past
  - Surface water drainage
  - Fences and gates

- Figure 3 – Land Use
  - Surrounding land uses
  - Adjacent land owners

- Figure 4 – Well Locations
  - Production and groundwater monitoring wells, municipal wells, and residential wells within a two-mile radius of the facility

3.1 Topography

The site is located within the landform region commonly referred to as the Southern Iowa Drift Plain. The topography is characterized by steeply rolling hills interspersed with areas of uniformly level upland divides and level alluvial lowlands. Typical ground surface elevations in the area range from 1,245 feet above mean sea level (amsl) in valleys to 1,310 feet amsl along ridges (GES, 1993).

The WDC facility slopes from 1,290 to 1,250 feet amsl from northwest to southeast (**Figure 1**). The Middle Platte River is approximately 550 feet to the southeast of the site and the surface drainage from WDC would flow to the river. The facility is situated in the Platte drainage basin.

3.2 Land Use

Land use in the area surrounding the facility is industrial and agricultural, as shown on **Figure 3**. Industrial areas are generally located to the west and north of the facility in the Creston Industrial Park, including GITS Manufacturing to the west; the City street garage, Union County Engineering facility maintenance yard, and Advanced Ag to the northwest; and Eblen Construction, ADS, Pioneer Seeds, and an electrical substation to the north. GITS Manufacturing produces lubricating devices. The land immediately north of WDC is in the industrial park area, but remains in agricultural use. To the northeast, across Osage Street, land uses include a salvage yard, Cropmate agricultural service company, and a former City dump, now used for a compost site. Cultivated cropland is located east and south of the facility. The closest residence is approximately 600 feet from the facility property limits to the southeast. There is no zoning in the Township of Highland.

3.3 Climate

The normal annual precipitation for south-central Iowa is 33.7 inches. Precipitation is greatest in the spring and summer months. The monthly mean temperatures for south-central Iowa range from 22° to 75° F. Temperatures historically have dropped below freezing at least once during every month except June, July, and August (M&E, 1993).

3.4 Regional Geology and Hydrogeology

A detailed description of the regional geology, hydrology, and hydrogeology conditions of the Creston, Iowa, area is provided in the Hydrogeologic Investigation Report (GES, 1993). A copy of the text of this report is provided in **Appendix C**. Highlights of the regional geology, hydrology, and hydrogeology include the following:

- Unconsolidated sediments in the region consist of glacial deposits or alluvial deposits. Glacial deposits consist of loess and till. Alluvial deposits are associated with ancient and present-day river channels and floodplains.
- The unconsolidated deposits in the area are typically 250 to 280 feet thick.
- Bedrock in the region consists of upper and middle Pennsylvanian deposits of limestone, siltstone, and shale.
- The Pennsylvanian system is approximately 1,000 feet thick in the area.
- The sources of domestic groundwater in the region are sand and gravel lenses found within till deposits, shallow alluvial deposits, buried bedrock channel deposits, and surface waters.

3.5 Site-Specific Geology and Hydrogeology

A detailed description of the site geology, hydrology, and hydrogeology conditions is provided in the Hydrogeologic Investigation Report (GES, 1993). A copy of the text of this report is provided in **Appendix C**. Soil boring logs for borings completed at the site are provided in **Appendix D**. Major findings concerning the site geology, hydrology, and hydrogeology include the following:

- Generally, the site geology consists of loess or alluvium over till. Loess deposits at the site are typically 5 to 10 feet thick when present. Alluvial deposits at the site are typically 10 to 20 feet thick when present. The till is generally weathered to a depth of approximately 23 to 28 feet. Occasional lenses of sand (0.5 to 7 feet thick) are found within the till. Bedrock was not encountered to a maximum boring depth of 100 feet on site.
- The Middle Platte River is located approximately 550 feet southeast of the site and flows in a southwesterly direction.
- The average hydraulic conductivity measured in the site alluvium deposit is 3.3×10^{-5} centimeters/second (cm/s).
- The average hydraulic conductivity measured in the weathered glacial till, including sand lenses, is 6.5×10^{-5} cm/s.
- The average hydraulic conductivity measured in the unweathered glacial till, including occasional sand lenses, is 3.5×10^{-7} cm/s.
- Shallow groundwater flow direction at the site is from northwest to east/southeast.

The City of Creston water supply source is surface water. Specifically, the City obtains water from Summit Lake and Green Valley Lake, which are located northwest of Creston. The WDC facility receives water from the City of Creston and has no water supply wells. Private water supplies in the areas around Creston likely come from private wells installed in alluvial sediments or sand lenses within the till. The locations of water supply wells within two miles of the WDC facility are shown on **Figure 4**.

Shallow groundwater flowing southeast from the site likely discharges to the Middle Platte River. There are no known water supply wells between the facility and the river.

Soil boring logs from the landfill wells and 1998 site assessment activities are included in **Appendix D**.

Numerous water table maps have been previously generated for this facility. Shallow groundwater contour maps for March 2003 and September 2003 are included in **Appendix C** (Earth Science

Consultants, Inc., 2003). While shallow groundwater contour maps are available for the facility, there is a need for potentiometric surface maps. To address this and other potential hydrogeology data gaps, the collection of additional groundwater data will be necessary during the RFI and will be proposed in the RFI Workplan. The first step of this additional hydrogeology data gathering will be an evaluation of the monitoring well network to determine if the existing network can provide adequate characterization of groundwater flow and extent of groundwater contamination.

4.0 DESCRIPTION OF SWMUS, SPILL AREAS, AND AOCS

4.1 Summary of Areas

A total of 12 SWMUs were identified in the RFA as follows:

- SWMU 1 – Former Wastewater Treatment Sludge Storage Area
- SWMU 2 – Current Wastewater Treatment Sludge Storage Area
- SWMU 3 – Spent Solvent Storage Area
- SWMU 4 – Spent Chromic Acid Aboveground Storage Tank (AST) and Containment Structure
- SWMU 5 – Spent Chromic Acid Transfer Tank
- SWMU 6 – Wastewater Treatment System
- SWMU 7 – Waste Methanol Drum Storage Area
- SWMU 8 – Former Magnesium Dross Storage Area
- SWMU 9 – Magnesium Dross Treatment Area
- SWMU 10 – Waste Acid Collection Pit
- SWMU 11 – Waste Acid Dump Pit
- SWMU 12 – Landfill

Known or potential spill areas or other contamination areas that are not directly related to one of the SWMUs listed above include the following areas of concern (AOCs):

- AOC A – Chlorinated Solvents in Soil and Groundwater
- AOC B – Petroleum AST Area

The location of each SWMU or AOC is shown on **Figure 2** and each SWMU or AOC is described in more detail below. For each SWMU or AOC, the following discussion provides the information required

in the Order, including the location of the unit/area; quantities of solid and hazardous waste; hazardous waste of constituents, to the extent known; and areas where additional information is necessary. For the 12 SWMUs identified in the 1994 RFA, the description from the RFA is also included below, along with an update of the current status of the unit. For those areas with known or potential contamination, the nature and degree of contamination is discussed in **Section 5.0** of this report.

4.2 SWMU 1, Former Wastewater Treatment Sludge Storage Area

4.2.1 Location

The former wastewater treatment sludge storage area was located north on an outdoor concrete slab north of the main production building and south of the pattern warehouse (**Figure 2**). This area was formerly used to store wastewater treatment sludge collected from the filter press of the wastewater treatment system (SWMU 6).

4.2.2 RFA Description

A. Unit Description

The former wastewater treatment sludge storage area is located in an area between the main production building and the Pattern Warehouse (Figure 14). The wastewater treatment sludge was accumulated in 55-gallon drums and stored on a concrete slab. The former wastewater treatment sludge storage area measured 51 feet by 25 feet. The drums were placed on wooden pallets and covered with lid protectors. Mr. Vass stated that the maximum volume of sludge on-site at any time was 24 cubic yards (85 drums).

The wastewater treatment sludge was generated from a filter press and accumulated in a hopper in the wastewater treatment system area. From 1981 to May 1986, the wastewater treatment sludge was removed from the hopper and dried. The dried sludge was placed into drums and stored in the former wastewater treatment sludge storage area. The drums of dried sludge were stored in this area for more than 90 days until the drums were transported off-site for disposal.

At the time of the VSI the area was used to store miscellaneous parts (Appendix A, Roll 2 Photograph 17). The area was difficult to observe due to the amount and size of the equipment stored in this area and the presence of sand and dirt on the concrete surface. However, cracks were observed in the concrete pad. The concrete pad was reportedly cleaned after the drums of wastewater treatment sludge were removed and before any equipment was stored in this area. The CEI report dated May 26, 1983 stated that a small amount of filter cake was spilled on the pallets in this area. The report did not indicate the amount of spilled material or the condition of the concrete in this area. [8]

At the time of the SV, most of the miscellaneous parts had been removed from the concrete pad. Large cracks were apparent in the concrete (Appendix A, Roll 3, Photograph 1). The facility's consultant, Green Environmental Services, Inc. (GES), had

places caution tape around the closure area. I observed GES scrubbing the concrete pad with water and detergent and then rinsing the pad using a pressure washer (Appendix A, Roll 3, Photograph 2). The final rinse water sample was collected in a wet/dry vacuum. Between each rinse cycle, the wet/dry vacuum was decontaminated with detergent and water, and then triple-rinsed. The decontamination liquid was containerized. GES collected a final rinse water sample. I did not obtain a split sample of the final rinse water.

GES drilled three borings in the former wastewater treatment sludge storage area. The first boring (B-1) was drilled near a large piece of equipment in a cracked area of the concrete (Appendix A, Roll 3, Photograph 7). GES used a hand auger to auger a second boring (B-2). This boring was also located in an area of cracked concrete (Appendix A, Roll 3, Photograph 10). The third boring in the storage area was also hand augered in an area of cracked concrete (Appendix A, Roll 3, Photograph 13). GES collected soil samples from these borings. Each soil sample was mixed in stainless-steel bowl before filling the sample containers. I did not obtain a sample from these borings.

The fourth boring for the former wastewater treatment sludge area was installed in a downgradient area. Due to the amount of rainfall during the closure activities, the downgradient area was easily defined (Appendix A, Roll 3, Photographs 8 and 9). I observed rainwater accumulating in this area (Appendix A, Roll 3, Photograph 8). The rainwater flowed northeast, toward a tractor trailer located adjacent to the scrap metal storage shed (Appendix A, Roll 3, Photograph 9). GES drilled Boring B-5 in this downgradient area (Appendix A, Roll 3, Photograph 12). The soil sample was collected using a hand auger (Appendix A, Roll 3, Photograph 14). GES mixed the soil sample in a stainless-steal bowl before filling the sample container. I obtained a split sample from Boring B-5. The split soil sample is designated by the sample number ADF30-106. The sample location is shown on Figure 15.

The split soil analytical results are listed in Table 1. The split sample was analyzed for total chromium and total barium. The results show that total chromium is present in the soil sample at a concentration of 51.4 mg/kg. The split soil sample meets the clean-up objectives established in the EPA-approved closure plan.

B. *Waste Characteristics*

Wastewater treatment sludge, magnesium-barium dross and magnesium dross have been stored in this area. The wastewater treatment sludge contains chromium above regulatory levels and, therefore, the EPA hazardous waste code D007 applies to this waste.

Waste Description	*Hazardous Waste Code*
Wastewater Treatment Sludge	*D007*

C. *Migration Pathways, Evaluation of Release and Exposure Potential*

Surface Water: There appears to be a high potential for release to surface water. There was a documented spill of wastewater treatment sludge in 1983. The integrity of the concrete pad is compromised. A split soil sample obtained from a downgradient location showed total chromium present at 51.4 mg/kg. Therefore, it appears that spilled material in the storage area may have been transported downgradient by surface water. Any

remaining surface contamination may also be transported from the storage area via surface water runoff.

Soils: There appears to be a high potential for past release to the soil. There is a documented spill of material in this area and cracks were observed in the concrete pad. A split soil sample obtained from a downgradient boring contained 51.4 mg/kg total chromium. This concentration is below the established clean-up objective; however, it indicated that paste waste management practices have resulted in the release of chromium from this former storage area.

Groundwater: There appears to be a high potential for past releases to the groundwater. Although the material handled in this area was semi-solid and solid, there is a documented spill and cracks are present in the concrete pad. A split soil sampled obtained from a downgradient boring contained 51.4 mg/kg total chromium. The extent of potential groundwater contamination is unknown.

Subsurface Soil Gas: There does not appear to be a potential for past subsurface soil gas migration/release in this area. The materials managed in this area contained heavy metals. Therefore, subsurface soil gas contamination is not expected.

Air: There appears to be a slight potential for past releases to the air. Semi-solid sludge was brought to this area and dried. The dried sludge was then packaged into drums. However, this potential no longer exists since this operation has ceased.

4.2.3 Current Status

Prior to conducting the RFA, the USEPA had determined that hazardous waste was stored in this area longer than 90 days, and therefore this area was subject to the closure requirements for hazardous waste management units. USEPA approved a closure plan for the unit in August 1992, and closure activities began in August 1993.

A Closure Certification Report was submitted to USEPA in December 1994 indicating this unit had been closed in accordance with the approved closure plan (Howard R. Green Company (H.R. Green), 1994). The USEPA certified closure of this unit in a letter dated November 4, 2003. A copy of the Closure Certification Report is included in **Appendix E**.

Soil samples collected in this area indicated no chromium contamination (GES, 1993). Samples were collected from soil borings B-1 through B-5 on April 7, 1993. The results are summarized in the Closure Certification Report (**Appendix E**). The chromium results were all below the Closure Performance Standard of 100 milligrams per kilogram (mg/kg) and the pH of the soil samples was within the Closure Performance Standard range.

4.2.4 Quantities of Solid and Hazardous Wastes

Based on information presented in the RFA, the maximum volume of wastewater treatment sludge accumulated at one time was 24 cubic yards (85 drums). No waste is currently stored at this location.

4.2.5 Hazardous Waste or Constituents

The wastewater treatment sludge formerly stored in this area exceeded the TCLP limit for chromium so it was a hazardous waste with code D007.

4.2.6 Need for Further Action

No further action is proposed for the Former Wastewater Treatment Sludge Storage Area (SWMU 1) because closure of this unit has been completed.

4.3 SWMU 2, Current Wastewater Treatment Sludge Storage Area

4.3.1 Location

The current wastewater treatment sludge storage area is located outside near the northeast corner of the main building, on the edge of the paved parking area/driveway (**Figure 2**). This area is used to store wastewater treatment sludge collected from the filter press of the wastewater treatment system (SWMU 6).

4.3.2 RFA Description

A. Unit Description

The current wastewater treatment sludge storage area is located near the northeast corner of the main production building on the edge of the concrete parking lot (Figure 14). The sludge is accumulated in a 20-cubic yard steel roll-off bulk container (Appendix A, Roll 2, Photograph 15). The container is covered by a heavy canvas tarp and danger signs are located at each corner of the container. The container provided by the disposal company. An empty container is provided by the disposal company when the full container is removed.

At the time of the VSI, no visible staining or evidence of spills was observed. FWD has used this method of accumulation since 1986. The container has always been located in this area.

B. Waste Characteristics

Wastewater treatment sludge is the only known hazardous waste stored in this area. The sludge contains chromium above regulatory levels and, therefore, the EPA hazardous waste code D007 applies to this waste.

Waste Description	*Hazardous Waste Code*
Wastewater Treatment Sludge	*D007*

C. *Migration Pathways, Evaluation of Release and Exposure Potential*

Surface Water: There does not appear to be a potential for release to the surface water. The inspectors did not observe any evidence indication spills or releases in this area.

Soils: There does not appear to be a potential for release to the soil due to the lack of evidence indication contamination in this area.

Groundwater: There does not appear to be a potential for release to the subsurface soil gas. The inspectors did not observe any evidence indicating spills or releases in this area.
Air: There does not appear to be a potential for release to the air. There were no reports of spills or leaks in this area.

4.3.3 Current Status

The current status of the wastewater treatment sludge storage area is essentially unchanged since the RFA. The wastewater treatment sludge is managed as a hazardous waste (D007) and is shipped to Peoria Disposal Company for disposal. As noted in the RFA, there is no apparent potential for a release from this SWMU.

4.3.4 Quantities of Solid and Hazardous Wastes

The 2000 RCRA Compliance Evaluation report (Booz Allen & Hamilton, 2000) estimated the generation rate for wastewater treatment sludge at approximately 60 tons per year. More recently, the rate of sludge generation has been lower due to lower foundry production. WDC's records indicate that 45 tons of sludge were shipped for disposal in 2002 and 22 tons were shipped in 2003.

4.3.5 Hazardous Waste or Constituents

The wastewater treatment sludge exceeds the TCLP limit for chromium so it is a hazardous waste with code D007.

4.3.6 Need for Further Action

Although there is no release history and low potential for a release, limited soil sampling is proposed for the Current Wastewater Treatment Sludge Storage Area (SWMU 2) to confirm that a release has not occurred. Details of this sampling will be outlined in the RFI Workplan.

4.4 SWMU 3, Spent Solvent Storage Area

4.4.1 Location

According to the RFA, a spent solvent storage area was formerly located inside the main production building near the former vapor degreaser in the Heat Treat area (**Figure 2**).

4.4.2 RFA Description

A. Unit Description

Spent solvents are stored near the vapor degreaser in the Heat Treat area (Figure 14). The spent solvents are accumulated in 55 gallon drums. Spent solvents have been stored in this area since 1981. However, an inspection report dated May 26, 1983 stated that at the time of the inspection, spent tetrachloroethylene was stored near the spent chromic acid above-ground storage tank. The report further stated that spent tetrachloroethylene and spent chromic acid are incompatible wastes and an unpredictable reaction could occur if the wastes accidentally were mixed. The date of operation of the storage area near the spent chromic acid above-ground storage tank is unknown.

Mr. Vass stated that the spent solvent storage area measures approximately three feet by three feet. The storage area is located inside the main production building and on a concrete floor.

At the time of the VSI, two 55-gallon drums were in storage in this area. One drum was labeled "Waste Chloroethene, F001, U229" and was approximately one-sixth full. The drum was dated February 21, 1992. The other drum was labeled "Waste Tetrachloroethylene solution, UN1897, F001, U210" and was approximately one-third full. The drum was dated January 13, 1992. Both drums were closed.

B. Waste Characteristics

Materials stored in this area include spent solvents identified with EPA hazardous waste code F001. The specific solvents stored in this area include spent tetrachloroethylene and spent chloroethene. There are no reports of any spills in this area.

Waste Description	*Hazardous Waste Code*
Spent Solvents (Tetrachloroethylene, Chloroethene)	*F001*

C. Migration Pathways, Evaluation of Release and Exposure Potential

Surface Water: There does not appear to be a potential for release to the surface water. The storage area is located inside the main production building and on a concrete floor which appeared to be in good condition.

Soils: There does not appear to be a potential for release to the soil due to the lack of evidence indicating contamination in this area and the presence of the concrete floor. No cracks or stains were observed on the concrete floor.

Groundwater: There does not appear to be a potential for release to the groundwater. No cracks or stains were observed on the concrete floor.

Subsurface Soil Gas: There does not appear to be a potential for release to the subsurface soil gas due to the lack of information and evidence indicating any spills or releases in this area. No cracks or stains were observed on the concrete floor.

Air: There does not appease to be a potential for release to the air. There were no reports of spills or leaks in this area. The drums were closed.

4.4.3 Current Status

Current site personnel (Mr. Haller and Mr. Bradley) have not witnessed any solvent storage in the area described for SWMU 3 during their time of employment beginning in 2000. BT^2 noted no evidence of solvent storage at this location during a site inspection in April 2004. Waste PCE solvent accumulating for disposal is currently stored in the warehouse (see **Figure 2**).

4.4.4 Quantities of Solid and Hazardous Wastes

The RFA noted that two 55-gallon drums of spent solvents identified as hazardous wastes were located in this area at the time of the 1994 RFA visual site inspection. During the 1988 RCRA compliance monitoring inspection, one drum of PCE was noted at this location (USEPA, 1988). During a follow-up inspection by USEPA in 1993, it was noted that no waste PCE had been generated since January 1991 and would not be generated until the next cleaning of the vapor degreaser, planned for later in 1993 (USEPA, 1993). No solid or hazardous wastes are stored at this location currently.

4.4.5 Hazardous Waste or Constituents

The RFA identified the spent solvents formerly stored at this location as hazardous wastes with code F001. Specific solvents known to have been stored at this location include PCE and chloroethene.

4.4.6 Need for Further Action

Due to the lack of a release history or potential noted during the RFA or compliance inspections, no further action is proposed for the former Spent Solvent Storage Area (SWMU 3). Any potential releases from the possible former storage of spent PCE near the spent chromic acid tank mentioned in the RFA description above will be addressed as part of the larger investigation of chlorinated solvents in soil and groundwater (AOC A, **Section 4.14**).

4.5 SWMU 4, Spent Chromic Acid AST and Containment Structure

4.5.1 Location

The spent chromic acid AST was formerly located approximately 40 feet north of the main production building and 8 feet east of the scrap metal storage shed (**Figure 2**).

4.5.2 RFA Description

A. Unit Description

The spent chromic acid above-ground storage tank is located forty feet north of the main production plant and eight feet east of the scrap metal storage shed (Figure 14). The tank is constructed of polypropylene plastic and is located inside a concrete containment structure (Appendix A, Roll 2, Photograph 2). The containment structure measure approximately 18 feet by 13 feet and is approximately four feet high. The containment structure is approximately six inches thick [13]. The containment structure is lined with a 20-millimeter thick plastic liner. All materials of construction utilized for storage of waste chromic acid have been designed to be impermeable for an indefinite period of time, but not less than five years.

At the time of the VSI, dark brown liquid was present in the containment structure. There appeared to be a leak from the tank where the hose entered the tank (Appendix A, Roll 2, Photograph 3). A clean area on the side of the tank was present below the hose coupling. Four dead birds (one adult and three juveniles) were present in the southwest corner of the containment structure. The concrete containment structure was broken on all corners; however, the integrity of the concrete did not appear to be compromised.

The containment structure is surrounded on the east, west and south sides by concrete. A grassy area is located north of the containment structure (Appendix A, Roll 2, Photograph 4). The waste acid dump pit is adjacent to the containment structure to the south (Appendix A, Roll 2, Photograph 4).

At the time of the SV, the spent chromic acid aboveground storage tank has been cut in half (Appendix A, Row 3, Photograph 3). Both halves of the tank were still present inside the containment structure (Appendix A, Roll 3, Photograph 4). Mr. Vass stated that most of the solid residue had been removed from the tank. However, the bottom half of the tank still contained a small amount of residue (Appendix A, Roll 3, Photograph 5). Two FWD employees pressure washed the top half of the tank. The tank was cleaned inside the containment structure. After the top half of the tank was cleaned, it was removed the containment structure (Appendix A, Roll 3, Photograph 6).

The inside and outside of the bottom half of the tank was moved to aid in cleaning the entire outer surface of the tank (Appendix A, Roll 3, Photograph 6).

GES pressure washed the containment structure liner and collected the wash water with a wet/dry vacuum (Appendix A, Roll 3, Photograph 15). The containment structure liner was stained dark brown around the edges. I obtained a split sample of the final rinsate from the containment structure liner. The rinsate water split sample is designated with

the sample number ADF30-001. The split sample result is shown in Table 1. The rinse water split sample contained 4.130 mg/l total chromium and 0.188 mg/l total barium. The split sample exceeds the established cleanup objective for total chromium (0.05 mg/l). A cleanup objective was not established for total barium.

After the inside of the containment structure liner was pressure washed, GES cut the liner into smaller sections for easier handling and pressure washed the outside of the containment structure liner (Appendix A, Roll 3, Photograph 17). After the liner was cleaned, it was removed from the containment structure and placed in the current wastewater treatment sludge storage container for disposal in a hazardous waste landfill in Peoria, Illinois.

After the liner was removed, the inside of the containment structure was inspected. A yellow-colored powder was present and the bottom of the containment structure appeared to have been patched with asphalt (Appendix A, Roll 3, Photograph 18). GES applies sodium metabisulfite to the yellow powder. The material turned green, confirming Mr. Vass' suspicions that the yellow-colored powder was hexavalent chromium (Appendix A, Roll 3, Photograph 18 and 19). Mr. Vass explained that the sodium metabisulfite converted the hexavalent chromium to the less hazardous trivalent chromium.

GES pressure washed the inside of the containment structure after applying sodium metabisulfite. Lime was placed in the downgradient corner to neutralize the water. The inside of the containment structure was further inspected. An asphalt-patched seam was present near the north end of the containment structure (Appendix A, Roll 3, Photograph 20). A large asphalt patch was located south of the asphalt-patched seam. A crack was present near the south end of the containment structure and asphalt patching was present adjacent to the south wall (Appendix A, Roll 3, Photograph 21). The entire containment structure floor was corroded, pitted and stained.

Two borings were installed in the containment structure. One boring was installed near the intersection of the asphalt-patched seam and a crack present near the north end of the containment structure (Appendix A, Roll 3, Photograph 23). A second boring was installed near the intersection of three cracks in the south end of the containment structure (Appendix A, Roll 3, Photograph 22). GES collected soil samples from these boring. Each soil sample was missed in a stainless-steel bowl before filling the sample container. I obtained a split soil sample from the boring installed in the north end of the containment structure. The split soil sample is identified with the sample number ADF30-107. The located of the split sample is shown in Figure 5. The split soil sample appeared to be a sandy fill-type material. The split soil sample was analyzed for total chromium. The split soil sample results are shown in Table 1. The results show that the split soil sample collected contained 188 mg/kg total chromium. This level exceeds the established cleanup objective of 100 mg/kg.

The top zero to six inches of soil from the south boring contained green-and orange-colored material. Mr. Vass stated that this indicated chromate contamination. GES reported that the amount of green-and orange-colored material decreased with depth and was almost non-existent at twelve to eighteen inches.

B. Waste Characteristics

Spent chromic acid with the EPA hazardous waste codes D002 and D007 was handled in this area. Reportedly, spent tetrachloroethylene was also stored in this area.

Waste Description	*Hazardous Waste Code*
Spent Chromic Acid	*D002, D007*
Spent Tetrachloroethylene	*F001*

C. Migration Pathways, Evaluation of Release and Exposure Potential

Surface Water: There appears to be a low potential for release to the surface water. A rinsate split sample from the containment structure liner contained chromium and barium. However, the integrity of the liner appeared to be intact. The concrete surface of the containment structure appeared to be pitted and corroded, and powered hexavalent chromium was present on the bottom surface. However, no evidence of release was observed on the outside of the containment structure. Any water which would accumulate in the containment structure would evaporate.

Soil: There is a high potential for release to the soil. The bottom of the containment structure contains many large cracks and asphalt patching in the concrete. A split soil sample obtained from a boring beneath the containment structure contained 188 mg/kg total chromium. Background samples should be collected to determine the concentration of chromium naturally occurring in the soils in this area.

Groundwater: There appears to be a high potential for release to the groundwater. The bottom of the containment structure contains many large cracks and asphalt patching in the concrete. A split soil sample obtained from a boring beneath the Containment structure contained 188 mg/kg total chromium. Therefore, the groundwater in this area may contain chromium.

Subsurface Soil Gas: There does not appear to be a potential for release to the subsurface soil. The containment detected in this area is a heavy metal and, therefore, is not expected to be present in the subsurface soil gas.

Air: There does not appear to be a potential for release to the air. The storage tank was enclosed. The tank has been removed, thereby eliminating any future potential for release to the air.

4.5.3 Current Status

The facility initiated closure activities for this unit in 1993 in accordance with an EPA-approved closure plan. Closure activities included cleaning/disposal of the storage tank and concrete tank containment pad, and excavation and disposal of soils containing chromium above clean closure standards. During soil remediation activities for SWMU 4, the Waste Acid Dump Pit (SWMU 11) was encountered. Additional clean closure activities completed during 1993 to 1995 addressed both of these SWMUs and included removal of the Waste Acid Dump Pit and associated contaminated soil. Soil and groundwater samples

collected following remedial efforts indicated chromium concentrations remained above clean closure levels.

The nature and extent of contamination in SWMU 4/11 area is discussed in more detail in **Section 5.1**. Interim measures taken to address the contamination, including soil excavation and groundwater monitoring, are discussed in **Section 7.1**.

In additional to the chromium impacts, site assessment sampling performed in 1998 detected chlorinated solvents in shallow groundwater samples collected east and west of the former spent chromic acid AST. These detections could potentially be related to past spent solvent storage in this area. Results of the site assessment sampling are discussed in **Section 5.4**.

4.5.4 Quantities of Solid and Hazardous Wastes

According to the RFA, the spent chromic acid tank had a volume of 5,000 gallons. The tank has been removed and no hazardous waste is currently stored at this location. The volume of spent solvents potentially stored in this area in the past is not known. Solvent storage at this location was not identified during the RCRA compliance inspections by USEPA in 1987, 1988, or 1993.

4.5.5 Hazardous Waste or Constituents

Spent chromic acid formerly stored in the AST was a hazardous waste with codes D002 (corrosive) and D007 (TCLP-chromium). Spent PCE that may have been stored in this area in the past was a hazardous waste with code F001.

4.5.6 Need for Further Action

Additional investigation is needed to evaluate the nature, extent, and potential exposure risks associated with the chromium remaining in soil and groundwater at the former spent chromic acid AST (SWMU 4). The specific analyses to be completed will be addressed in the RFI Workplan. Because past investigations indicate that contamination from this SWMU has merged with contamination from the former waste acid collection pit (SWMU 11), these two SWMUs will be treated as a single unit for purposes of further investigation and/or corrective action.

4.6 SWMU 5, Spent Chromic Acid Transfer Tank (AST)

4.6.1 Location

The spent chromic acid tank was a mobile unit used to transfer chromic acid from the process tank where it was used to the spent chromic acid AST (SWMU 4) located north of the main building. The chromic acid process tank is located in the Acid Etch area shown on **Figure 2**. According to the RFA, the mobile tank was also used to transport chromic acid from the AST to the wastewater treatment system (SWMU 6) (see **Figure 2**) after on-site treatment was started and before the AST was removed.

4.6.2 RFA Description

A. Unit Description

The spent chromic acid is transported from the process tank to the spent chromic acid above-ground storage tank using a portable 1,000-gallon neoprene-lined steel tank (Appendix A, Roll 2, Photograph 4).

The spent chromic acid transfer tank is pulled to the southeast corner of the spent chromic acid above-ground storage tank containment structure to pump spent chromic acid from the transfer tank to the storage tank. The pumping transfer apparatus is located inside the containment structure. Therefore, accidental spillage during transfer operations would be contained inside the containment structure. Any spills outside of the containment structure would flow east from the containment structure. Concrete construction joints and cracks are present in the concrete in this area (Appendix A, Roll 2, Photograph 2). Currently, approximately 500 gallons of spent chromic acid are removed from the storage tank weekly and transported to the wastewater treatment system for treatment.

At the time of the VSI, no visible staining or evidence of spills was observed. There are no reports of any spills in this area.

B. Waste Characteristics

Spent Chromic acid has been transported in the spent chromic acid transfer tank. The EPA hazardous waste codes D002 and D007 apply to this waste.

Waste Description	*Hazardous Waste Code*
Spent Chromic Acid	*D002, D007*

C. Migration Pathways, Evaluation of Release and Exposure Potential

Surface Water: There is a slight to moderate potential for release to the surface water. The concrete pad was cracked, but no scaling or other evidence of release was observed. However, any spills from this unit would directly contact the surface water. Incidental spillage during transfer operations would be contained inside the containment structure.

Soils: There is a slight to moderate potential for release to the soil. Any spills from this unit would directly contact the soils. We did not observe any evidence of spills or releases in this area. The transfer operation has ceased and, therefore, there is no potential for future releases to the soil from this unit.

Groundwater: There is a slight potential for release to the groundwater. Any spills from this unit would directly contact the soil and could be transported to the groundwater. The inspectors did not observe any evidence indicating spills or releases in this area. The transfer operation has ceased and, therefore, there is no potential for future releases to the groundwater from this unit.

Subsurface Soil Gas: There does not appear to be a potential for release to the subsurface soil gas due to the lack of evidence indicating contamination in this area. The transfer operation has ceased and, therefore, there is no potential for future releases to the subsurface soil gas from this unit.

Air: There does not appear to be a potential for release to the air. The transfer tank is covered and air pressure is used to transfer the waste acid. The transfer operation has ceased, therefore eliminating any potential for future releases to the air.

4.6.3 Current Status

As noted in the RFA, the spent chromic acid transfer tank has not been used since 1993 or earlier, when use of the spent chromic acid AST was discontinued. Spent acid is currently transferred to the wastewater treatment system (SWMU 6) via aboveground piping, where it is treated and then released to the POTW.

4.6.4 Quantities of Solid and Hazardous Wastes

The RFA indicated that the mobile spent chromic acid transfer tank had a capacity of 1,000 gallons. The volume of acid currently used in each acid etch tank ranges from approximately 600 to 900 gallons. A WDC meeting agenda from 1980 lists a total volume of 12,000 gallons of waste acid for the first three quarters of 1980. The RCRA Part A permit application prepared by WDC in 1983 listed the annual quantity of chromic acid as 120,000 with a unit of measure code "P." This code is not listed on the form but is assumed to stand for pounds. At an estimated unit weight of 8.5 pounds per gallon, this is equivalent to approximately 14,000 gallons per year.

4.6.5 Hazardous Waste or Constituents

The spent chromic acid transported in the transfer tank was a hazardous waste with codes D002 (corrosive) and D007 (TCLP chromium).

4.6.6 Need for Further Action

Due to the limited potential for releases and lack of evidence of any historic releases, no further action is proposed specifically for the spent chromic acid transfer tank (SWMU 5). If a release did occur during

transfer, the most likely location would be during loading in the waste acid collection pit area (SWMU 10) or unloading at the spent chromic acid AST (SWMU 4). Therefore, investigation of these two SWMUs will address the limited potential for a release from the former transfer tank (SWMU 5).

4.7 SWMU 6, Wastewater Treatment System

4.7.1 Location

The wastewater treatment system is located in the main production building as shown on **Figure 2**.

4.7.2 RFA Description

A. Unit Description

Waste acids collected in the Etch Line concrete pit and spent acids from the Etch Line process are treated in the on-site wastewater treatment system. From 1965 to 1981, wastewater was treated in a continuous treatment method. In that method, the wastewater was treated to precipitate the metals and other solid material and neutralize the waste acids. The precipitate was allowed to settle in a clarifier tank. The effluent was released to the POTW. Precipitate was periodically removed from the clarifier tank.

In 1981, the current wastewater treatment system was installed. The current wastewater treatment system consists of two 2,500-gallon plastic batch treatment tanks, a filter press and a hopper to accumulate the wastewater treatment sludge generated by the filter press.

There have been no known releases of chromium-bearing wastewater treatment sludge since the installation of the batch wastewater treatment system in 1981. According to a facility representative, before 1981 there were several undocumented releases of treated, but not clarified, material to the POTW. Since the material was reportedly legally treated at the time, no records exist about the amounts of material which may have been released.

B. Waste Characteristics

From 1965 to present spent acids, including hydrofluoric acid, nitric acid and sulfuric acid, were treated in the on-site wastewater treatment system. The spent chromic acid was accumulated in the spent chromic acid above-ground storage tank and sent off-site for treatment. In April/May 1992 FWD initiated on-site treatment of spent chromic acid in the on-site wastewater treatment system.

Waste Description	*Hazardous Waste Code*
Hydrofluoric Acid *Spent Chromic Acid* *Nitric Acid* *Sulfuric Acid*	*D002, D007*

C. *Migration Pathways, Evaluation of Release and Exposure Potential*

Surface Water: There appears to be a low potential for release to the surface water. The wastewater treatment system is located inside the main production building on a concrete floor. The concrete floor appeared to be intact.

Soils: There appears to be a slight potential for past release to the soil. The concrete floor in the wastewater treatment system area appeared to be intact. However, the integrity of the effluent discharge system is unknown. There is evidence of past releases to the effluent discharge system, but the volume and characteristics of the released material is unknown.

Groundwater: There appears to be a slight potential for past release to the groundwater. There were several undocumented releases of treated, unclarified material to the effluent discharge system. The integrity of the effluent discharge system is unknown. However, since the volume and characteristics of the materials released from the wastewater treatment system are unknown, the extent of potential contamination cannot be adequately assessed at this time.

Subsurface Soil Gas: There appears to be a slight potential for past subsurface soil gas migration/release in this area. There were several undocumented releases of treated, unclarified material to the effluent discharge system. However, since the volume and characteristics of the materials released from the wastewater treatment system are unknown, the extent of potential contamination cannot be adequately assessed at this time.

Air: There appears to be a low potential for release to the air. The batch treatment tanks are partially closed.

4.7.3 Current Status

The wastewater treatment system is still in use essentially as described in the RFA. The batch treatment process includes the following steps:

1. Reduce hexavalent chromium to trivalent chromium by addition of sodium metabisulfite or another reducing agent.
2. Adjust pH to 8.5 with lime to precipitate chromium hydroxide.
3. Add flocculant to aid removal of precipitate.
4. Recycle through filter press to remove solids until turbidity meter indicates acceptable result.
5. Send treated water to holding tank for use in Zyglo rinse tank.
6. Discharge Zyglo rinse water to POTW.

Accumulated material from the filter press (wastewater treatment sludge) is placed in a 20-cubic yard steel roll-off bulk container in the current wastewater treatment sludge storage area (SWMU 2). From

1981 to May 1986, wastewater treatment sludge was placed in drums in the former wastewater treatment sludge storage area (SWMU 1).

The system currently operates under a Treatment Agreement with the City of Creston dated April 4, 2001. On November 6, 2000, and January 12, 2001, WDC received notices of violation from the City of Creston for exceeding one or more effluent standards, including at least one violation for chromium, oil and grease, biological oxygen demand (BOD), fluoride, total suspended solids, and pH. A notice of violation was also issued by the IDNR on February 23, 2001 for exceeding the permit limits for chromium at various times during the second half of 2000. WDC resolved the pretreatment problems through improved employee training and quality assurance for the wastewater treatment process. No further notices of violation have been issued since 2001.

4.7.4 Quantities of Solid and Hazardous Wastes

Based on water treatment records maintained by WDC, the volume of wastewater treated in 2003 was 553,700 gallons. Somewhat higher volumes were treated in previous years: 767,500 gallons in 2001 and 783,500 gallons in 2002. The wastewater treatment volume varies with the foundry production level.

4.7.5 Hazardous Waste or Constituents

The untreated wastewater has the characteristics of corrosivity (D002) and toxicity for chromium (D007). However, the wastewater treatment system is exempt from the RCRA hazardous waste treatment requirements because it is a pretreatment system regulated under the Clean Water Act through a treatment agreement with the City of Creston. The treated wastewater no longer has the hazardous characteristics and is also excluded from regulation on Subtitle C of RCRA because it is a permitted discharge to a POTW. The treatment process converts hexavalent chromium to trivalent chromium, adjusts the pH, and removes the chromium through precipitation, flocculation, and filtration.

4.7.6 Need for Further Action

The potential for a release to the environment from the wastewater treatment system (SWMU 6) appears limited; however, some additional investigation is proposed due to the lack of information regarding the integrity of the effluent discharge system.

4.8 SWMU 7, Waste Methanol Drum Storage Area

4.8.1 Location

The former waste methanol drum storage area was located off the edge of the paved driveway near the northeast corner of the main production building, south of the wastewater treatment sludge storage area (SWMU 2) and north of the product drum storage area (**Figure 2**). This area is no longer used for waste methanol storage.

4.8.2 RFA Description

A. Unit Description

The waste methanol drum storage area is located south of the current wastewater treatment sludge storage area (Appendix A, Roll 2, Photograph 15) and north of a product storage area (Appendix A, Roll 2, Photograph 16). The waste methanol was accumulated in 55-gallon drums and placed on wooden pallets in this area. Mr. Vass stated that the storage area measured approximately three feet by three feet. Waste methanol has been stored in this area since 1981. The waste methanol storage area is located on grass on the edge of a paved area.

At the time of the VSI, no visible staining or evidence of spills or contamination was observed. There are no reports of any spills in this area.

B. Waste Characteristics

Waste methanol is the only documented waste stored in this area. At the time of the VSI, two drums of unknown material were stored in this area. Mr. Vass stated that the material in the drums appeared to be water and partially solidified binder. Neither drum was labeled or securely closed.

C. Migration Pathways, Evaluation of Release and Exposure Potential

Surface Water: There is a slight to moderate potential for release to the surface water. There were no reports of spills or leaks in this area. However, any spills from drums stored in this unit would directly contact surface water. The facility reports that only securely closed drums are stored in this area.

Soils: There is a slight to moderate potential for release to the soil. Any spills from drums stored in this unit would directly contact the soil. The inspectors did not observe any evidence of spills or releases in this area. The facility reports that only securely closed drums are stored in this area.

Groundwater: There is a slight to moderate potential for release to the groundwater. Any spills from this unit would directly contact the soil and could be transported to the groundwater. The inspectors did not observe any evidence indicating spills or releases in this area. The facility reports that only securely closed drums are stored in this area.

Subsurface Soil Gas: There does not appear to be a potential for release to the subsurface soil gas due to the lack of evidence indicating contamination in this area. The facility reports that only securely closed drums are stored in this area.

Air: There does not appear to be a potential for release to the air. There were no reports of spills or leaks in this area. The facility reports that only securely closed drums are stored in this area.

4.8.3 Current Status

The waste methanol drum storage area is no longer in use. Waste methanol is no longer generated for disposal. Unused methanol product in unopened drums is stored in the product drum storage area, adjacent to the former location of the waste methanol drum storage area.

4.8.4 Quantities of Solid and Hazardous Wastes

The quantity of waste methanol stored at this location in the past is not known exactly, but based on the RFA description of the area size (3 feet by 3 feet), it appears unlikely that more than a few 55-gallon drums would have been stored at this location.

4.8.5 Hazardous Waste or Constituents

Waste methanol has a hazardous waste code of F001 as a spent solvent.

4.8.6 Need for Further Action

As noted in the RFA, the facility indicated that only securely closed drums were stored in this area. This area is no longer used for waste storage. If a methanol release had occurred in the past, methanol photodegrades rapidly in sunlight and also breaks down quickly in soil or water, so it is unlikely that any effects would remain today. Although there is a lack of known releases and low potential for a release, limited soil sampling is proposed for the Waste Methanol Drum Storage Area (SWMU 7) to confirm that a release has not occurred. Details of the sampling will be outlined in the RFI Workplan.

4.9 SWMU 8, Former Magnesium Dross Storage Area

4.9.1 Location

The former magnesium dross storage area is described in the RFA as being east, south, and west of the dross shed and also on a portion of the landfill (**Figure 2**).

4.9.2 RFA Description

A. Unit Description

The November 10, 1988 CEI report identified two magnesium dross storage areas (Figure 7). One area was located west of a building on the landfill. This area was used for storage of magnesium dross. The second area was located east of the building (Figure 7). This area was used for the storage of magnesium-barium dross stored in 55-gallon drums. The drums were stored on wooden pallets and stacked two drums high. Both storage areas had grassy bottoms. The November 10, 1988 CEI report stated that some of the drums of magnesium-barium dross had fallen off the wooden storage pallet. The report further stated that one drum was split. At the time of the 1988 inspection, there were a total of 1,453 drums of magnesium and magnesium-barium dross.

At the time of the 1992 VSI, approximately 700 drums of magnesium and magnesium-barium dross were in storage. Mr. Vass stated that a maximum quantity of 2,750 drums had been stored in this area. Mr. Vass stated that FWD had stored the dross after termination of the reclamation agreement with a recycling firm in 1986. A total of 109 drums of magnesium dross were shipped to off-site recycling facilities in 1987 and 1988. There is no documentation of magnesium dross shipments between 1988 and 1991. Mr. Vass stated that FWD initiated on-site treatment of the magnesium-barium dross and magnesium dross in the spring of 1991.

It appears that the drums may have been moved between 1988 and 1992. The present location of the drums does not correspond to the locations identified in the November 10, 1988 CEI report. At the time of the VSI, the storage areas were located south of the building in the Landfill (Figure 14). Mr. Vass indicated that the drums containing magnesium-barium dross were located in the farthest south group of drums (Appendix A, Roll2, Photograph 14). A larger group of drums directly south of the building reportedly contained magnesium dross.

The inspectors observed several split drums in the magnesium dross and magnesium-barium dross storage areas (Appendix A, Roll 2, Photograph 13). All of the drums appeared to be closed. The inspectors observed that labels were present on some of the drums. The labels appeared to be hazardous waste labels. Labels that were still present on the drums had been painted black and were illegible. Part of a hazardous waste label was found on the ground in the magnesium dross storage area. The only identifiable marking on the label was "UN2813".

At the time of the SV, all the drums of magnesium dross and magnesium-barium dross had been treated and the treated dross had been disposed in the on-site landfill. Mr. Vass stated that FWD currently has a backlog of dross that was generated during the winter. Mr. Vass explained that the dross cannot be treated during the cold winter months.

I collected five surface soil samples from the former magnesium dross storage area. The approximate sample locations were shown on Figure 15. Mr. Vass stated that after the drums had been removed, spilled material present on the ground surface was removed by FWD employees. I did not sample in the west section of the storage area and he did not want the surface soil disturbed in that area. The surface soil samples were collected with clean stainless-steel spoons. Each soil sample was mixed in a clean stainless-steel bowl

before filling the sample container. Each surface soil sample was analyzed for total barium and total chromium. The surface soil sample results are listed in Table 1 (sample numbers 101 through 105). The results indicated that barium and chromium are present in the surface soils. However, the chromium is present below the established cleanup objective listed in the closure plan. There is no cleanup objective for barium.

B. Waste Characteristics

Magnesium dross, magnesium-barium dross, used oil, and the one-time generated resin waste are the only known materials stored in this area. The resin waste resulted from the accidental mix of resin and hardener. The EPA hazardous waste code D001 is applied to the resin waste. There is documentation of spills of magnesium dross and magnesium-barium dross in this area.

C. Migration Pathways, Evaluation of Release and Exposure Potential

Surface Water: There appears to be a moderate potential for release to the surface water. There are documented spills of material in this area. However, since the volume of released material is unknown, the extent of potential contamination cannot be adequately assessed at this time. Surface soil samples collected during the SV indicated chromium and barium are present in the surface soils.

Soils: There appears to be a high potential for release to the soils. There are documented spills of material in this area and spilled material would directly contact the ground surface. The volume of released material is unknown, therefore the extent of potential contamination cannot be adequately assessed at this time. Surface soil samples collected during the SV indicate chromium and barium are present in the surface soils.

Groundwater: There appears to be a slight potential for release to the groundwater. Although the material stored in this area is solid, the material has the potential to migrate through the soil to the groundwater. However, since the volume of the spilled material is unknown, the extent of potential contamination cannot be adequately assessed at this time. Surface soil samples collected during the SV indicate chromium and barium are present in the surface soils.

Subsurface Soil Gas: There does not appear to be a potential for subsurface gas migration/release in this area since the materials stored in this area are solid and the contaminants of concern are chromium and barium, which are metals.

Air: There does not appear to be a potential for releases to the air due to the solid physical state of the material. Also, the material was stored in closed drums and there are no known volatile constituents in the material.

4.9.3 Current Status

As noted in the RFA, the storage locations for untreated magnesium dross and magnesium-barium dross have varied somewhat through time. At the time of the BT^2 site visit on April 1, 2004, untreated dross was present south of the dross shed, east of the dross shed, north of the dross shed, and east of the former leachate storage shed. The dross is treated to reclaim magnesium scrap metal, which is currently sold to Shapiro Sales of St. Louis, Missouri, for recycling.

A large portion of the area formerly used for dross storage falls within the limits of the former thorium burial area currently being investigated under the authority of the IDPH. The Statement of Purpose in the Order states "the Order does not include requirements for the characterization/corrective action of radiological constituents at the Facility currently being addressed by the Iowa Department of Public Health." Characterization of the former burial area was documented in a Site Characterization Survey Report submitted to IDPH in September 2003. The area investigated as part of the site characterization is outlined on **Figure 2**.

The used oil AST is also located within the area formerly used for untreated dross storage, directly west of the dross shed. The used oil AST is used to collect used oil from on-site mobile equipment, such as forklifts and end loaders. The oil is picked up for recycling.

4.9.4 Quantities of Solid and Hazardous Wastes

The untreated dross is stored on-site for reclamation of magnesium scrap metal. The magnesium dross is a non-hazardous waste (USEPA, 2000). The quantities stored awaiting treatment have varied significantly with time as noted in the RFA. As of November 2003, WDC estimates that approximately 48,180 cubic feet of dross (approximately 6,560 drums) are stockpiled awaiting processing (WDC, 2003). The total volume reclaimed in 2003 was approximately 14,479 cubic feet. For 2004, WDC is implementing some improvements to the dross treatment process to increase the rate of magnesium reclamation and eliminate the stockpiles as soon as possible.

The used oil AST has a capacity of 2,000 gallons. The quantity of oil generated annually is approximately 1,500 gallons. The used oil is not a hazardous waste.

4.9.5 Hazardous Waste or Constituents

The magnesium dross contains magnesium along with other constituents from the flux materials, which include barium, calcium, magnesium, sodium, potassium, chloride, and fluoride. A sample of the untreated dross collected and analyzed for the RFA contained 5,370 mg/kg barium and 51.7 mg/kg chromium (M&E, 1993).

The used oil contains typical petroleum constituents. Heavy metals such as lead or chromium can also be found in used oil at low concentration.

4.9.6 Need for Further Action

The dross storage areas have the potential to release constituents such as barium to the environment; so further evaluation of these areas is proposed. However, for purposes of the RFI, the area covered by the radiological investigation under IDPH authority will be excluded from the SWMU 8 investigation area. This area will be addressed under IDPH authority. Portions of SWMU 8 that are outside of the radiological investigation area will be included in the RFI.

Due to the proximity of the dross storage and treatment areas, a joint investigation of SWMUs 8 and 9 is recommended, excluding the radiological investigation area.

4.10 SWMU 9, Magnesium Dross Treatment Areas

4.10.1 Location

The magnesium dross treatment area is located north of the northwest corner of the landfill, between the former leachate storage shed and the dross shed (**Figure 2**).

4.10.2 RFA Description

A. Unit Description

Two magnesium dross treatment areas are in operation at FWD. One area is located near the northeast corner of the main production building (Figure 14). Two magnesium dross treatment hoppers are located in this area (Appendix A, Roll 2, Photographs 5 and 6). Each hopper has a capacity of 30 cubic yards or twenty-four 55-gallon drums. An in-ground wash pit is located between the treatment hoppers (Appendix A, Roll 2, Photograph 5). The in-ground wash pit is approximately six feet wide by eight feet long by eight feet deep. The pit is constructed of steel and has a rubber lining. A steel lid is present to cover the pit. The pit is used to clean the magnesium melt pots. Mr. Vass stated that no magnesium-barium melt pots have been cleaned in the in-ground wash pit. Mr. Vass explained that water is utilized to loosen the material in the melt pots. The solid material removed from the melt pots is treated in the on-site magnesium dross treatment hoppers.

The inspectors observed the inside of the treatment hoppers (Appendix A, Roll 2, Photograph 7). Mr. Vass explained that the treatment process involved the addition of water and sodium sulfide to the dross. Mr. Vass stated that the sodium sulfide binds with the barium to form an insoluble compound. Mr. Vass stated that hydrogen and ammonia gases are released during the treatment process. Mr. Vass stated that the treatment process is very temperature dependent and that treatment time ranges from 24 hours to two weeks.

The second treatment area is located near the building on the landfill (Figure 14). A 30-foot by 40-foot containment area and a 100-foot by 36-foot concrete pad are located in the treatment area (Appendix A, Roll 2, Photographs 8, 9 and 10). Drums of magnesium dross are opened and emptied on the west end of the confinement area (Appendix A, Roll 2, Photograph 8). Material that has been treated once and requires further treatment is stored on the east end of the confinement area (Appendix A, Roll 2, Photograph 8). The magnesium dross is transferred from the confinement area to a treatment hopper. A total of four treatment hoppers are located on the concrete pad. The integrity of the concrete pad appeared to be intact.

Mr. Vass stated that a barium test is conducted on every batch. The test is conducted by FWD's on-site laboratory. Mr. Vass stated that all the magnesium dross is treated and tested. Mr. Vass further stated that one sample is sent off-site for analysis each year to validate the on-site laboratory results. The Iowa State Hygienic Laboratory is the off-site laboratory used.

A drainage pipe was located south of one of the treatment hoppers (Appendix A, Roll 2, Photograph 9). The concrete pad is sloped so that surface water runoff would flow toward the drainage pipe. The drainage pipe discharges into the landfill.

I collected a sample of untreated magnesium during the SV. The sample was collected with a clean stainless-steel spoon. The sample was transferred directly to the sample container. The sample is designated with the sample number ADF30-108. The sample location is shown on Figure 15. The sample was analyzed for total barium and total chromium. The results are listed in Table 1 and show that the sample contained 5,370 mg/Kg total barium and 51.7 mg/Kg total chromium. A sample of treated magnesium dross was not collected at the time of the SV since no treatment batches had completed the treatment process.

B. *Waste Characteristics*

Magnesium dross and magnesium-barium dross are the only known wastes handled in this area.

C. *Migration Pathways, Evaluation of Release and Exposure Potential*

<u>Surface Water</u>: There appears to be a moderate potential for release to the surface water. The magnesium dross drums are emptied in the confinement area. The confinement area is curbed on three sides, but one side opens to the concrete pad. The concrete pad slopes to the south toward an unpaved area. The confinement area is not roofed. The water used in the treatment process is recovered and reused in a future treatment process. The water reportedly does not contain any hazardous constituents. There is no evidence of release in this area.

<u>Soils</u>: There appears to be a moderate potential for release to the soils. The magnesium dross is piled near the edge of the confinement area and the inspectors observed magnesium dross material on the outside of the containment area. The volume of magnesium dross released to the soil surrounding the confinement area is unknown, therefore the extent of potential contamination cannot be adequately assessed at this time. Any vehicles traveling in this area could potentially track barium from the site.

Groundwater: There appears to be a slight to moderate potential for release to the groundwater. Although the material stored in this area is solid, the material has the potential to migrate through the soil to the groundwater. The water used in the treatment process is recovered and reused in a future treatment process. The water reportedly does not contain any hazardous constituents. There is no evidence of release of liquid or solid materials in this area.

Subsurface Soil Gas: There does not appear to be a potential for subsurface gas migration/release in this area. The material stored in this area is solid and the potential contaminant of concern is a heavy metal, barium.

Air: There appears to be a high potential for release to the air due to the nature of the treatment process. During treatment, hydrogen gas and ammonia gas are released. The volume of gas released is unknown, therefore the extent of potential contamination cannot be adequately assessed at this time.

4.10.3 Current Status

Magnesium dross treatment is still ongoing; however, there appear to be some errors in the process description in the RFA. First, the material added to precipitate the soluble barium is anhydrous sodium sulfate, not sodium sulfide as described in the RFA. Sodium sulfate was used in the past as well. Second, the process does not release ammonia to the air. There are no nitrogen compounds in the dross or in the treatment process, so there is no source for ammonia.

The dross is currently treated in the second area described in the RFA, on the concrete pad between the Dross Shed and the Former Leachate Storage Tank Shed. No dross treatment takes place at the wash pit described as being near the northeast corner of the building; however, the magnesium melting pots are cleaned at this location.

4.10.4 Quantities of Solid and Hazardous Wastes

The quantities of untreated magnesium dross were discussed above under SWMU 8. The dross treatment process produces magnesium hydroxide sludge as a final waste product. The dross treatment sludge is a solid, non-hazardous waste and is disposed of in the on-site landfill as allowed under the IDNR permit. WDC records indicate that 420 tons (wet weight basis) of sludge were landfilled in 2003.

4.10.5 Hazardous Waste or Constituents

The dross treatment sludge is not a hazardous waste and its constituents are generally non-leachable and of low toxicity. The sludge is primarily magnesium hydroxide and barium sulfate. Each batch of sludge is tested to ensure that the leachable barium level is acceptable prior to disposal of the sludge.

4.10.6 Need for Further Action

As noted in the RFA, the magnesium dross treatment area is not completely contained and there is some potential for a release of untreated dross, treated dross, or the treatment water to the environment. In addition, the dross treatment area is surrounded by the untreated dross stockpiles. Due to the proximity of these areas, a joint investigation of the dross storage and treatment areas (SWMUs 8 and 9) is recommended.

4.11 SWMU 10, Waste Acid Collection Pit

4.11.1 Location

The waste acid collection pit is located under the process tanks in the acid etch area in the main production building (**Figure 2**). Waste acids are collected here and then pumped to the Wastewater Treatment System (SWMU 6).

4.11.2 RFA Description

A. Unit Description

There are nine tanks associated with the acid etching process. Seven of the tanks are neoprene-coated steel, four feet wide by eight feet long and five feet deep. The other two tanks are polyvinylchloride plastic tanks, eight feet wide by eight feet long and five feet deep. Four of the seven steel tanks are rinse tanks. All the tanks and the surrounding rinse area are positioned in a concrete pit, which is recessed below the floor to collect any overflow from the tanks. The collected overflow from the recessed concrete waste acid collection pit is pumped to the wastewater treatment system area where the overflow material is treated and tested before release to the local POTW.

The integrity of the concrete waste acid collection pit could not be observed since the pit is located beneath the tanks and is surrounded by a concrete floor. The waste acid collection pit is unlined.

B. Waste Characteristics

Materials handled in this area include hydrofluoric acid, nitric acid, sulfuric acid, chromic acid and rinse water.

C. Migration Pathways, Evaluation of Release and Exposure Potential

Surface Water: There appears to be a slight potential for release to the surface water. The waste acid collection pit is located inside the main production building. The integrity of the waste acid collection pit is unknown. The potential for release should be re-examined after the integrity of the waste acid collection pit is determined.

Soils: There appears to be a slight potential for release to the soil. The integrity of the waste acid collection pit is unknown. The potential for release should be re-examined after the integrity of the waste acid collection pit is determined.

Groundwater: There appears to be a slight potential for release to the groundwater. The integrity of the collection pit is unknown. The potential for release should be re-examined after the integrity of the waste acid collection pit is determined.

Subsurface Soil Gas: There appears to be a slight potential for subsurface gas migration/release due to the unknown condition of the waste acid collection pit. The potential for release should be re-examined after the integrity of the waste acid collection pit is determined.

Air: There appears to be a high potential for release to the air. The waste acid collection pit is not covered. Any material accumulated in the collection pit would evaporate into the atmosphere.

4.11.3 Current Status

The waste acid collection pit is still in use as described above. In addition to the acids listed in the RFA, acetic acid is now also used. All wastewater from the acid etch tanks and rinse tanks passes through the collection pit prior to transfer to the wastewater treatment system. The treated wastewater is used as rinse water in the Zyglo process then discharged to the POTW in accordance with WDC's treatment agreement with the City of Creston.

4.11.4 Quantities of Solid and Hazardous Wastes

Based on water treatment records maintained by WDC, the total volume of wastewater treated in 2003 was 553,700 gallons.

4.11.5 Hazardous Waste or Constituents

The untreated wastewater collected in the pit has the characteristics of corrosivity (D002) and toxicity for chromium (D007). However, the wastewater treatment system is exempt from the RCRA hazardous waste treatment requirements because it is a pretreatment system regulated under the Clean Water Act through a treatment agreement with the City of Creston.

4.11.6 Need for Further Action

To further characterize the potential for a release to soil or groundwater from the waste acid collection pit, some additional information is needed. The potential for a release will be evaluated by sampling soil and groundwater at and near the pit.

4.12 SWMU 11, Waste Acid Dump Pit

4.12.1 Location

The former waste acid dump pit was located adjacent to the south side of the former spent chromic acid AST (SWMU 4).

4.12.2 RFA Description

A. Unit Description

The waste acid dump pit is located adjacent to the spent chromic acid above-ground storage tank and containment structure (Figure 14). The waste acid dump pit is approximately six feet wide, ten feet long and eight feet deep with six-inch concrete walls (Appendix A, Roll 2, Photograph 4). Approximately 10,000 gallons of waste acids were disposed in the pit between 1965 and 1971. The waste acid dump pit was filled with limestone to neutralize the waste acids. When use of the waste acid dump pit was discontinued in 1971, the pit was filled with sand and capped with a six-inch concrete slab. No liners, leachate collection system, gas collection system, or containers were utilized during the disposal of waste acid. It has been proposed that the waste acids have leached through the limestone rocks into the surrounding soil. The inspectors did not observe any evidence of contamination at the surface near the waste acid dump pit.

B. Waste Characteristics

Acids disposed in the waste acid dump pit include hydrofluoric, nitric, sulfuric and chromic acids. The acids were placed in the waste acid dump pit in combined form and, therefore, the exact amounts of each acid type are unknown. Tests were not conducted on the spent solutions; therefore, concentration levels are also unknown.

C. Migration Pathways, Evaluation of Release and Exposure Potential

Surface Water: There does not appear to be a potential for release to the surface water. There is no evidence of contamination at the surface surrounding the waste acid dump site.

Soils: There is a high potential for release to the soil. Approximately 10,000 gallons of waste acids were disposed in the unlined concrete pit and were presumably released to the surrounding soils. The integrity of the unlined concrete pit is unknown.

Groundwater: There is a high potential for release to the groundwater from the unlined waste acid dump pit. It has been proposed that the waste acids have leached from the waste acid dump pit into the surrounding soils. The heavy metal, chromium, was contained in the chromic acid. Chromium would be considered highly toxic and persistent. It is moderately soluble in water and chromium oxide is a known carcinogen and bioaccumulater.

Subsurface Soil Gas: There is a slight potential for subsurface soil gas migration/release in this area. Approximately 10,000 gallons of waste acids were disposed in the unlined concrete pit and were presumably released to the surrounding soils.

Air: There appears to be a slight potential for past releases to the air from the waste acid dump pit. The pit was not covered during operation. However, this potential no longer exists since operations in this unit have ceased and the pit is covered.

4.12.3 Current Status

As noted in the RFA, the waste acid dump pit has not been used since 1971. During soil remediation activities for SWMU 4 in 1993, the waste acid dump pit (SWMU 11) was encountered. Additional clean closure activities completed during 1993 to 1995 addressed both of these SWMUs and included removal of the waste acid dump pit and associated contaminated soil. Soil and groundwater samples collected following remedial efforts indicated chromium concentrations remained above clean closure levels.

The nature and extent of contamination in the SWMU 4/11 area is discussed in more detail in **Section 5.1**. Interim measures taken to address the contamination, including soil excavation and groundwater monitoring, are discussed in **Section 6.1**.

4.12.4 Quantities of Solid and Hazardous Wastes

Hydrofluoric, nitric, sulfuric and chromic acids are believed to have been disposed of in the waste acid dump pit. The quantities and concentrations of acids disposed on in the pit are not known. These acids were disposed of prior to the initial implementation of RCRA.

4.12.5 Hazardous Waste or Constituents

The primary constituent of concern for the waste acid dump pit is chromium. Other potential contaminants include fluoride, nitrate, or sulfate. There is also a potential for reduction of the pH in the soil and groundwater to mobilize metals that are naturally present in the soil; however, it is likely that the limestone in the pit and the underlying soil had a significant buffering capacity, limiting the effect of the acid on the soil and groundwater pH.

4.12.6 Need for Further Action

Additional investigation is needed to evaluate the nature, extent, and potential exposure risks associated with the chromium remaining in soil and groundwater at the former waste acid dump pit (SWMU 11). Because the release of acidic materials to site soil may cause elevated groundwater concentrations of inorganic constituents other than those associated with the acidic material, evaluation of site groundwater conditions will require analysis for additional inorganic parameters. The specific analyses to be

completed will be addressed in the RFI Workplan. Because past investigations indicate that contamination from this SWMU has merged with contamination from the former spent chromic acid tank (SWMU 4), these two SWMUs will be treated as a single unit for purposes of further investigation and/or corrective action.

4.13 SWMU 12, Landfill

4.13.1 Location

The landfill is located east of the plant buildings (**Figure 2**).

4.13.2 RFA Description

A. Unit Description

The landfill was designed to be approximately 650 feet by 600 feet with an average depth of 15 feet and a volume of 216,700 cubic yards. At the time of the VSI, the landfill contained approximately 153,000 cubic yards of material. Between 1970 and 1976, approximately 275 to 290 drums of thorium process sludge and metal splatter were buried in the landfill. A rough sketch of potential locations of past low-level radioactive waste burials is included as Figure 6. From 1980 to 1981, approximately 420 cubic feet of chromium-bearing wastewater treatment sludge was buried in the landfill. The June 24, 1981 CEI report stated that wastewater treatment sludge had been disposed in the landfill from 1972 to 1981. The report stated that approximately 12 tons of wastewater treatment sludge were disposed each year from 1972 to 1981. The location of the sludge could not be verified.

Leachate water from the landfill is collected in lagoons (Appendix A, Roll 2, Photographs 11 and 12). The collected water is used in the magnesium dross treatment process. At the time of the VSI, the inspectors observed bubbles in a lagoon (Appendix A, Roll 2, Photograph 12). Mr. Vass had stated earlier that bubbling activity was an indication that the magnesium dross treatment process was not complete. The inspectors asked Mr. Vass if the observed bubbling activity was an indication of the presence of unreacted magnesium dross. Mr. Vass stated that he could not make that determination.

On July 15-18, 1986, a review of waste disposal practices and a survey of current radiological conditions related to past and present waste disposal were conducted by the Radiological Site Assessment Program of ORAU. Surface and subsurface measurements and sampling identified buried deposits of thorium process sludge within an area of the landfill believed to have been previously used for such disposals. Most of these burials were only slightly (30 cm or less) below the surface and are, therefore, not in compliance with the regulations in effect at the time of the burials. These regulations required that the waste be covered with 1.2 meters (four feet) of clean fill.

Groundwater samples from monitoring wells on June 8, 1990, and from monitoring wells and a domestic water sample collected on June 26, 1990, did not reveal any significant levels of radionuclides that may impact human health. Figure 7 depicts the locations of

the monitoring wells. Annual monitoring of the groundwater for radionuclides is currently being performed by FWD as a licensing requirement of the IDPH. Monitoring well results from 1987 to 1992 are included in Appendix D.

In August 1980, four surface water samples from leachate waters accumulated in lagoons in the landfill were collected and analyzed for fluoride, magnesium, aluminum and chromium. The results are tabulated below. Aluminum was present in concentrations ranging from 0.22 to 3.5 mg/L. The Secondary Maximum Contaminant Level (SMCL) for aluminum is 0.05 mg/L. Chromium was present in levels below the Maximum Contaminant Level (MCL) of 0.05 mg/L. Fluoride concentrations ranged from 1.4 to 16 mg/L. The SMCL for fluoride is 2.0 mg/L. Magnesium was present in concentrations ranging from 16 to 470 mg/L. The World Health Organization (WHO) Drinking Water Standard for magnesium of 150 mg/L. Therefore, long-term incidental ingestion of the contaminated surface water may result in unacceptable health risk. Currently, no consumption of on-site surface waters as drinking water is practiced. [17]

Contaminant (mg/l)	*Range of Concentration*	*Comparative Standard*
Aluminum	*0.22 - 3.5*	*0.05 SMCL*
Chromium	*<0.05*	*0.05 MCL*
Fluoride	*1.4 - 16*	*2 SMCL*
Magnesium	*16 - 470*	*150 WHO*

The ORAU investigation concluded that although subsurface water samples from the landfill contained elevated gross beta concentrations, the levels were well within the NRC guidance values for thorium series radionuclides in water released to unrestricted areas. Currently, this water is not a source of drinking water and is not subject to the EPA Interim Primary Drinking Water Regulations. The ORAU investigation further concluded that an elevated thorium concentration detected in sediment samples from the sanitary sewage drain system indicated small current or past releases of material through this pathway; however, no evidence of a significant release was detected at the local wastewater treatment facility. Surface water drainage samples and plant perimeter surveys conducted by the ORAU investigation did not identify any off-site migration of thorium contamination.

Tables 2 and 3 present the radiation levels measured in surface water from 20-meter grid intervals on-site and surface soil samples from the site perimeter. The samples were collected during the ORAU investigation. The locations of the samples are indicated in Figures 16 and 17. The range of concentrations of these radionuclides is slightly higher than background levels in the Creston area; however, they are within NRC guidance levels.

During the 1993 SV, groundwater samples from MW-1, MW-2, MW-3, MW-6 and MW-SH were collected (appendix A, Roll, 4, Photograph 1). GES samples each monitoring well quarterly. Therefore, dedicated bailers and polypropylene ropes were present in each well. The bailers are polyvinyl chloride (PVC) plastic bailers with a diameter of 1.5 inches. The bailers have a capacity of one quart. Mr. Randy Gavin, GES, and Mr. Tim Pistone, M&E, collected the groundwater samples. The groundwater samples were placed in one-liter containers that contained five milliliters of nitric acid as a preservative. GES obtained split samples from each well.

The first monitoring well sampled was MW-6. Mr. Gavin suggested that since this well was slow to recover, and we were only on-site for the one day, the well could be purged to the screened interval depth and a sample collected immediately. Mr. Gavin stated that this well has taken 24 to 48 hours to recover in the past. The calculated well volume was 4.3 gallons. Approximately 3.25 gallons of water was purged from the well to lower the water column in the well to the screened interval depth. The groundwater sample was immediately collected. The groundwater sample was transferred directly from the bailer to the sample container. The sample was designated with the sample number ADF30-003.

The second monitoring well sampled was MW-2. Approximately six gallons of water was purged from the monitoring well. The calculated well volume was 1.92 gallons. A sample (ADF30-004) and a duplicate sample (ADF30-005) were collected from MW-2. The samples were transferred directly from the bailer to the sample containers.

The third monitoring well sampled was MW-SH. The calculated well volume for this well was 7.5 gallons. Therefore, approximately 22.5 gallons of water was purged form the well. The groundwater sample was transferred directly from the bailer to the sample container. The sample was designated with the sample number ADF30-006.

The fourth monitoring well sampled was MW-1. This well is slightly artesian. At the time of the SV, water was present to the top of casing. The calculated well volume for MW-1 was 2.5 gallons. Therefore, approximately 7.5 gallons of water was purged from this well. The groundwater sample was transferred directly from the bailer to the sample container. The sample was designated with the sample number ADF30-002.

The final monitoring well sampled was MW-3. The calculated well volume for this well was 1.5 gallons. Therefore, approximately 4.0 gallons of water was purged form the well. The groundwater sample was transferred directly from the bailer to the sample container. The sample was designated with the sample number ADF30-09.

The sampling results are presented in Table 4. The results indicate that barium and chromium are present in the groundwater. Monitoring Well MW-2 contained the highest concentration of barium and chromium.

B. Waste Characteristics

Materials disposed in the landfill include: thorium process sludge, metal splatter, chromium-gearing wastewater treatment sludge, treated magnesium dross, foundry sand waste, and baghouse dust.

C. Migration Pathways, Evaluation of Release and Exposure Potential

Surface Water: There is a high potential for release to the surface water. In August 1980, surface water samples were collected from the lagoons. These surface water samples contained aluminum, fluoride and magnesium in concentrations exceeding established SMCLs and WHO Drinking Water Standards. Chromium was detected in concentrations below the MCL.

Soils: There is a high potential for release to soils. There is documented radioactive contamination present in the soils in the landfill.

Groundwater: There is high potential for release to the groundwater. There is documented contamination of the groundwater. Radioactive contamination has been detected in the groundwater in concentrations above those typically found in groundwater, but within NRC guidelines. The concentration of lead detected in the groundwater is considered to be significant from a public health standpoint. However, at present there are no human receptors for the contaminated groundwater.

Subsurface Soil Gas: There is no potential for release to the subsurface soil gas. The contaminants of concern in this unit are radioactive and heavy metals. These contaminants are not expected to be found in the gaseous state under normal atmospheric conditions.

Air: There is no potential for release to the air. The contaminants of concern in this unit are radioactive and heavy metals. These contaminants are not expected to be found in the gaseous state.

4.13.3 Current Status

The landfill continues to be used for on-site disposal of foundry sand, baghouse dust, and treated magnesium dross. WDC collects groundwater samples from monitoring wells around the landfill semiannually. Groundwater samples collected from some of the monitoring wells have contained fluoride above the primary drinking water standard (or Maximum Contaminant Level (MCL)) and/or sulfate above the secondary drinking water standard or MCL. The Final Groundwater Quality Assessment Report prepared for the landfill (H.R. Green Co., 1997) presented documentation that background sulfate levels in the Creston area are also well above the secondary MCL and at least some of the sulfate in the landfill monitoring well samples is due to natural background. The nature and extent of groundwater contamination related to the landfill is discussed in greater detail in **Section 5.3**.

To reduce potential groundwater impacts associated with the landfill, a leachate collection system was installed around the east and south perimeter of the landfill the mid-1990s. Leachate is pumped from the landfill through a bag filter to a storage tank in the north end of the main production building. The leachate is tested for radioactivity and then discharged to the POTW in accordance with a treatment agreement with the City of Creston. The leachate discharge is monitoring monthly for fluoride, sulfate, several metals, and other water quality parameters, as discussed in **Section 5.3**.

The Order indicates that the RFI is not required to address the characterization of or corrective action for the radiological constituents being addressed by the IDPH. In addition, the landfill is permitted by IDNR under permit number 88-SDP-04-86P. The permit was renewed on January 21, 2004 and expires on January 21, 2007 unless it is renewed for another 3-year term. According to the Order, the IDNR issued a special provision to the landfill permit on December 2, 2002, allowing the USEPA and the facility to

address potential fluoride and sulfate issues in groundwater under the Order. We understand that other landfill issues will continue to be addressed by IDNR under the landfill permit and are not part of the RFI.

4.13.4 Quantities of Solid or Hazardous Waste

Solid wastes placed in the landfill include waste foundry sand, baghouse dust collector waste, and treated magnesium dross waste. In 2003, WDC records indicate that approximately 2,100 tons of sand/dust were landfilled along with approximately 150 tons of treated dross sludge. The capacity of the landfill expansion approved in the mid-1990s is 172,000 cubic yards, based on a time period beginning in 1991 (GES, 1993c). The RFA notes that as of the visual site inspection in 1992, approximately 153,000 cubic yards of material was already in the landfill. Based on these volumes, the estimated total capacity of the landfill is approximately 300,000 cubic yards. Currently, approximately 81,435 cubic yards of approved air space remains to be filled (Barker Lemar Engineering Consultants, 2004).

4.13.5 Hazardous Waste or Constituents

Based on past groundwater monitoring under the authority of the IDNR, fluoride and sulfate in groundwater were identified in the Order as the contaminants of concern to be addressed in the RFI.

4.13.6 Need for Further Action

Additional investigation of the nature and extent of groundwater contamination downgradient from the landfill area and evaluation of the potential risks associated with the contamination are proposed as part of the RFI. However, the RFI will not address the radiological constituents or other landfill issues that are not related to the sulfate and fluoride groundwater contamination. These issues will be addressed under the existing IDNR sanitary landfill permit and/or the IDPH authority.

4.14 AOC A, Chlorinated Solvents in Soil and Groundwater

4.14.1 Location

During site assessment soil and groundwater sampling performed in 1998, chlorinated solvent contamination was detected in soil and groundwater east and north of the main production building. The specific locations and results are discussed in detail in **Section 5.4**.

4.14.2 Description

The soil and groundwater sampling performed in January and February 1998 detected chlorinated solvents in soil and/or groundwater at several locations east and north of the main production building. The highest concentrations were detected in two areas: 1) near the PCE storage tank on the east side of

the building, and 2) near the northeast corner of the building. The PCE storage tank is no longer used since the replacement of the vapor degreaser in late 2000 and is now empty. The specific sources of the chlorinated solvents in groundwater are not known. Based on the existing data, it is not yet know whether contamination from these two apparent source areas has merged to form a single plume, or whether additional solvent sources may be present.

On September 1, 1998, a PCE spill occurred at the PCE AST. About 50 gallons of PCE were spilled onto the underlying concrete pad and surrounding parking lot. The spill ran east across the parking lot and a small amount ran off the paved area. The USEPA was contacted about the spill and cleanup activities were initiated. More information on the spill is provided in **Section 2.2** and **Appendix B**.

Because the spill occurred in one of the areas identified in the pre-spill sampling as having PCE contamination, it is likely that any contamination from the spill overlaps with the previously detected solvent contamination.

4.14.3 Quantities of Solid and Hazardous Wastes

The quantity of PCE spilled in September 1998 was approximately 50 gallons. The quantities of any earlier releases are not known.

4.14.4 Hazardous Waste or Constituents

Hazardous constituents detected in the chlorinated solvent contamination in soil and/or groundwater include PCE, trichloroethylene, 1,2-dichloroethylene, vinyl chloride, and other chlorinated compounds. The sampling results are discussed in more detail in **Section 5.4**.

4.14.5 Need for Further Action

Additional investigation is needed to define the nature and extent of chlorinated solvent contamination in the soil and groundwater and to evaluate potential exposure pathways and risks. The results of sampling conducted to date are discussed in detail in **Section 5.4**.

4.15 AOC B, Petroleum Product AST Area

4.15.1 Location

The petroleum product ASTs are located adjacent to the parking lot/driveway near the northeast corner of the main production building (**Figure 2**), immediately southeast of the product drum storage area.

4.15.2 Description

The petroleum products ASTs at this location include two 300-gallon diesel tanks and one 300-gallon gasoline tank. An additional smaller AST formerly used for kerosene is located in the same area, but is not used. The ASTs do not currently have secondary containment; however, WDC expects to replace the ASTs with new systems with secondary containment in the near future. There was no evidence of leakage or obvious past spills during the April 1, 2004 site visit by BT^2; however, there is a potential for past drips, leaks, or spills, especially during loading or unloading.

A soil sample collected in this area during a 1998 site assessment contained 40 micrograms per kilogram (µg/kg) benzene, indicating a potential petroleum release; however, a groundwater sample from the same area did not contain detectable benzene or other petroleum compounds (see **Section 5.5**).

4.15.3 Quantities of Solid and Hazardous Wastes

The gasoline and diesel tanks contain products to be used, not wastes.

4.15.4 Hazardous Waste or Constituents

The petroleum products stored in the ASTs contain hazardous constituents typical for petroleum, such as benzene and toluene.

4.15.5 Need for Further Action

Although the initial sampling suggests only limited contamination in this area, some additional soil and groundwater sampling is needed to characterize the degree and extent of petroleum contamination in the petroleum product AST area.

4.16 Summary of Need for Further Action

Based on the assessment of the SWMUs and AOCs described above, additional evaluation as part of the RFI is proposed for the following areas of the facility:

- Former waste chromic acid AST and waste acid dump pit area – SWMUs 4 and 11
- Current wastewater treatment sludge storage area and the waste methanol drum storage area – SWMUs 2 and 7
- Magnesium dross treatment and storage area – SWMUs 8 and 9 (excluding radiological area)
- Landfill groundwater impacts – SWMU 12
- Chlorinated solvent contamination in soil and groundwater – AOC A

- Petroleum AST area – AOC B
- Waste acid collection pit – SWMU 10
- Wastewater treatment system (potential) – SWMU 6

These areas either have documented releases of hazardous constituents to the environment or have a reasonable potential that a release may have occurred. The remaining SWMUs do not appear to warrant additional investigation due to their low potential for releases to the environment and lack of known releases. For SWMU 6, where no documented release has occurred, additional evaluation could focus either on gathering additional information to characterize the potential for a release more accurately (e.g., inspecting the system) and/or sampling of potentially affected media.

Releases of acidic materials to the site soils could potentially result in increased concentrations of inorganic constituents in site groundwater. Inorganic constituents at elevated concentrations in site groundwater may not necessarily be associated with the specific acidic materials released. For this reason, evaluation of site groundwater conditions will require analysis for inorganic constituents beyond those found in facility wastes. Specific groundwater analytical parameters and sample locations will be addressed in the RFI Workplan.

5.0 NATURE AND EXTENT OF CONTAMINATION

Of the seven areas listed in the preceding section as requiring additional evaluation, at least some limited sampling has been conducted in five areas, including:

- Former waste chromic acid AST and waste acid dump pit area – SWMUs 4 and 11
- Magnesium dross treatment and storage area – SWMUs 8 and 9
- Landfill groundwater impacts – SWMU 12
- Chlorinated solvent contamination in soil and groundwater – AOC A
- Petroleum AST area – AOC B

The sampling results for these areas are described below. Potential exposure pathways are discussed in **Section 6.0**.

The nature and extent of contamination was evaluated based on information from the following sources:

- RFA sampling
- Soil and groundwater sampling performed as part of closure activities for the former chromic acid AST and former wastewater sludge storage area
- Groundwater sampling performed as part of the landfill monitoring program
- Soil and groundwater sampling performed as part of a voluntary site assessment by WDC in 1998

Specific sources of information are identified for each area in the following discussion.

5.1 Former Chromic Acid AST/Dump Pit Area (SWMUs 4 and 11)

During initial RCRA permitting of the facility in the late 1980s, the chromic acid AST was identified as a regulated hazardous waste management unit (HWMU) because hazardous waste had been stored in the AST for more than 90 days in the past. Since that time, several investigation and corrective action steps have been taken in an effort to obtain closure certification for this HWMU. The chronology includes the following events:

Date	Document or Field Event
April 1988	Closure Plan submitted to USEPA
August 11, 1992	Revised Closure Plan submitted to USEPA
August 24, 1992	Tentative Closure Plan Approval issued by USEPA
April 7, 1993	Closure Plan activities completed, but results indicate additional work needed
May 24, 1993	Notification of Additional Sampling and Removal Activities submitted to USEPA
December 14-15, 1993	Soil excavation and additional soil sampling completed, but results still indicate remaining chromium above regulatory levels
March 17, 1994	Closure Oversight Report prepared by Metcalf & Eddy for USEPA
May 12, 1994	Transmittal of Analytical Results from oversight sampling from USEPA to WDC

Date	Document or Field Event
June 13-17, 1994	Additional excavation and soil sampling completed, but results still indicate chromium above regulatory levels
August 9, 1994	Plan for proposed additional soil borings submitted to USEPA
October 10, 1994	Status report submitted to USEPA monitoring well sampling and deferring soil borings until spring 1995
December 1994	Closure Certification Report For Chromic Acid Tank and Chromium Hydroxide Sludge Storage Area submitted to USEPA (only certifies closure for sludge storage area)
April 10, 1995	Groundwater sampling results for MW-A submitted to USEPA
June 22, 1995	Soil boring and monitoring well sampling results submitted to USEPA, including new wells MW-1, MW-2, and MW-3.
August 1995 to Present	Groundwater sampling at downgradient monitoring wells MW-A and MW-3 continued on an approximate semiannual schedule

In April 1993, soil borings were installed and sampled in the vicinity of the chromic acid storage tank area. All of the soil samples had elevated concentrations of chromium. In December 1993, an excavation was completed in the area in an attempt to remove all of the chromium-impacted soil in order to obtain closure of the area. Excavation sidewall samples again indicated that elevated levels of chromium remained in the site soil. A second excavation in June 1994 again failed to remove all the contaminated soil. This excavation also encountered and removed the former waste acid dump pit, located directly south of the former chromic acid AST. Further investigation was performed in the area to determine the extent of the chromium contamination in April through June 1995, and included the installation of more soil borings and three monitoring wells (in addition to one pre-existing monitoring well).

Analytical results for the sampling performed through December 1994 are summarized in the Closure Certification Report (H.R. Green Co., 1994). The main body of this report, including the analytical results tables and sampling location figures, is included in **Appendix E**. Follow-up soil and groundwater sampling performed in May and June 1995 was documented in a letter to USEPA dated June 22, 1995, which is also included in **Appendix E**. [Note: There are three different sample sets that are all numbered as B-1, B-2, etc., so it is important to note the sampling date to identify the sample.]

As part of the 1998 site assessment sampling, eight soil samples were collected from various locations, including an unpaved area east of the chromium excavation area and several other locations around the plant. The detected chromium concentrations ranged from 2.1 to 32 mg/kg. These results are summarized in **Table 1** and are shown on the site map on **Figure 5**. The detected chromium levels were well below the cleanup objective of 100 mg/kg referred to in the RFA. These results are also below the generic Soil Screening Levels (SSLs) shown in **Table 1**.

The soil analytical results indicate that most of the chromium-contaminated soil above the water table has probably been excavated, but some soil contamination remains. The June 1994 excavation samples still indicated that the chromium was present above the revised cleanup goal of 400 mg/kg on the east, south, and southwest sidewalls of the excavation, with the highest results generally in or near the former waste acid dump pit location. However, soil samples from the six soil borings performed in May 1995 set back a short distance from the excavation perimeter generally contained much lower chromium concentrations. Only samples from boring B-5, located southeast of the excavation area, contained chromium above 400 mg/kg. At this boring, the shallowest sample, at 4.5 feet, had only 17 mg/kg chromium, but the samples from 8, 13, and 20 feet had chromium levels of 3,700 mg/kg, 910 mg/kg, and 470 mg/kg, respectively. At least the two deepest samples from this boring are probably below the water table.

The excavation extended approximately to the edge of the concrete to the east and south and was backfilled with clean fill. Most of the area is now covered by a good growth of turf grass.

Groundwater samples have been collected for chromium analysis regularly from two of the chromium area monitoring wells since their installation. These groundwater monitoring results are summarized in **Table 2** and shown on the site map on **Figure 6**. Some limited sampling of the old landfill monitoring wells for chromium was also performed in 1992 and as part of the RFA in 1993 (**Table 3**). As part of the 1998 site assessment sampling, one groundwater sample was collected from a geoprobe boring (WeC-B1) east-southeast of the SWMU 4/11 area and analyzed for chromium and other metals. The results of the 1998 sampling are shown in **Table 4** and on **Figure 6**.

The groundwater monitoring results indicate that chromium is present in the groundwater downgradient from the former waste acid dump pit and chromic acid AST at concentrations exceeding the primary maximum contaminant level (MCL), but may not extend very far from the source area. The highest chromium concentrations are at monitoring well MW-3, ranging from 13 to 56 mg/l over the 10-year monitoring period. For comparison, the MCL for chromium is 0.1 mg/l. Concentrations at this well appear to be gradually decreasing. At the other downgradient monitoring well in the chromium area,

MW-A, concentrations are lower, but are still slightly above the MCL. The other two chromium area monitoring wells, MW-1 and MW-2, did not contain detectable chromium (detection limit 0.04 mg/l) in the initial sampling and have not been included in the ongoing monitoring program. These wells appear to be upgradient from the chromium source area.

Beyond the two chromium area monitoring wells that are routinely sampled, some additional information on the extent of chromium contamination in groundwater is provided by the 1998 geoprobe groundwater sample and by previous sampling of the landfill monitoring wells for chromium. Geoprobe sample WeC-B1, collected approximately 50 feet east-southeast of MW-3, contained chromium at 0.13 mg/l, only slightly above the MCL of 0.1 mg/l. Samples collected from the old landfill monitoring wells (MW1 through MW4, MW6, and MWSH) in October 1992 did not contain detectable chromium, with a detection limit of 0.02 mg/l. Samples collected from these wells in April 1993 were split between the USEPA RFA contractor (M&E) and WDC's consultant (H.R. Green). The April 1993 results were all below the MCL, except for the USEPA lab results for old landfill well MW-2, which was 0.13 mg/l.

The geoprobe groundwater sample and landfill monitoring well results suggest that the chromium contamination in groundwater probably does not extend off site, but additional sampling will be needed to verify the extent.

5.2 Magnesium Dross Storage and Treatment Area (SWMUs 8 and 9)

Soil samples were collected in the magnesium dross storage area as part of the RFA, along with a sample of the untreated magnesium dross (**Table 5**). The soil samples were analyzed for total barium and total chromium. The barium results in soil ranged from 489 to 1,980 mg/kg, and the barium concentration in the untreated dross was 5,370 mg/kg. As shown in **Table 5**, these results are below the generic residential soil screening levels (SSLs) for ingestion or inhalation, indicating that the soil does not pose a direct contact risk. However, one of the soil results and the untreated dross result were above the generic SSL for the groundwater pathway, indicating that the soil and dross may have the potential to cause groundwater contamination. The SSLs shown in **Table 5** were calculated using the USEPA Soil Screening Guidance web site (see **Appendix G**).

Although the soil sampling indicated a potential for groundwater impacts from the dross storage area, samples collected from the old monitoring wells suggest that significant impacts have not occurred. Based on the southeast groundwater flow direction, the landfill wells are downgradient from the dross storage and treatment areas. Samples from the 1992 and 1993 groundwater sampling described in the

preceding section were also analyzed for barium, and all results were below the MCL of 2 mg/l. The maximum barium concentration detected in any of the old landfill monitoring wells was 0.83 mg/l.

Stormwater sampling results provide an indication of the potential for surface water runoff to play a significant role in the transport of contaminants related to dross storage and treatment. The available results are summarized in **Table 6** and the laboratory reports are provided in **Appendix F**. Barium concentrations for stormwater samples collected in 1978, 2002, and 2004 all fell in the range from 0.1 to 0.2 mg/l, which is well below the drinking water MCL. Fluoride levels reported in 1978 and 2002 ranged from 18 to 22 mg/l, exceeding the MCL. Fluoride may be associated with the landfill and/or the dross storage and treatment. Boron was reported at 41 mg/l in the only sample for which it was analyzed (2002 result), which is higher than a typical background level; however, boron is most likely associated with the foundry sand in the landfill rather than the dross.

In summary, the existing data suggest no current human health threat from the dross storage and treatment areas. However, due to the limited and somewhat dated information on soil, groundwater, and surface water contamination in these areas, additional information is needed to complete the definition of the nature and extent of any impacts. For purposes of the RFI, the portion of SWMU 8 that falls within the limits of the radiological investigation of the former thorium burial area will be excluded from investigation because this area is being addressed under the authority of IDPH.

5.3 Landfill Groundwater Impacts (SWMU 12)

Potential impacts from the landfill on groundwater quality have been evaluated as part of the landfill permit requirements under the authority of the IDNR. The landfill is not lined, but is constructed in relatively low permeability glacial till soils. A leachate collection system consisting of toe drains along the east and south perimeter of the landfill removes leachate collected at the base of the landfill.

Major reports and correspondence related to the groundwater quality at the landfill include the following (see **Section 8.0** for complete references):

Date	Document
1993	Supporting Documentation for Vertical Expansion and Leachate Control System
January 25, 1993	Hydrogeologic Investigation Report

Date	Document
February 4, 1993	Proposed Hydrologic Monitoring System Plan
October 1993	Closure/Postclosure Plan for the Fansteel/Wellman Dynamics Foundry Sand Landfill
March 1997	Final Groundwater Quality Assessment Report
March 11, 1998	Notification of Site Groundwater Quality Contamination and Permit Provisions Changes issued by IDNR
March 31, 1998	Fax from IDNR to WDC regarding groundwater quality issues
May 14, 1998	Letter to IDNR addressing issues raised in March 31 fax
May 15, 1998	Expanded GWQAP (Groundwater Quality Assessment Plan) letter to IDNR
1997 through 2003	Annual and/or semiannual Water Quality Reports
October 23, 2000	Renewed permit issued by IDNR for the period 10/23/2000 through 10/23/2003
January 3, 2001	Leachate Control System Performance Evaluation Report
January 21, 2004	Renewed permit issued by IDNR for the period 1/21/2004 through 1/21/2007

Six monitoring wells were installed around the facility landfill in 1985 to assess the potential for impacts to groundwater quality (MW-1 through MW-4, MW-6, and MW-SH). In 1990 through 1992, these wells were replaced by a network of 13 new monitoring wells (MW-6 through MW-18) and six leachate piezometers (LPZ-21 through LPZ-26). Since 1993, this network has been used to assess groundwater flow conditions and groundwater quality. Groundwater analytical results from the original group of landfill monitoring wells are presented in **Table 3**. The original wells were abandoned in 1995. Recent results from the current group of monitoring wells are summarized in **Table 7** and on **Figure 6**. Additional results are provided in **Appendix H**.

Although leachate sampling is not part of the routine monitoring program for the landfill, some leachate samples have been collected from the leachate piezometers. The leachate sampling data are summarized in **Table 8**, and the laboratory reports are provided in **Appendix I**. In addition, the leachate discharge from the storage tank to the sanitary sewer is monitored monthly. These results are summarized in **Table 9**.

The 1997 Final Groundwater Quality Assessment Report (H.R. Green, 1997) identified sulfate, fluoride, chloride, and magnesium as contaminants with elevated concentrations in groundwater. In the October 2000 and January 2004 permit renewals, the IDNR identified fluoride and sulfate as the primary contaminants of concern. Condition 10 of the January 2004 permit renewal indicates the fluoride and sulfate levels are to be addressed under the Order, as part of the RFI.

Fluoride concentrations exceed the MCL of 4 mg/l at wells MW-11, MW-13, and MW-17. These are all shallow water table monitoring wells located downgradient from the landfill. Deeper wells at the same well nests show fluoride levels below the MCL, indicating that the vertical extent of fluoride contamination is limited. Elevated fluoride concentrations have also been detected in surface water samples collected at monitoring point SW01, located where surface water leaves the property via a culvert under Osage Street.

The downgradient extent of fluoride in groundwater at levels above the MCL has not been determined through sampling; however, H.R. Green estimated that the plume boundary was within 50 to 60 feet of the eastern edge of the landfill based on a contaminant transport model (H.R. Green, 1997). Upgradient fluoride concentrations measured at water table monitoring well MW-8 are less than 1 mg/l.

The Final Groundwater Quality Assessment Report identified sources of fluoride in the landfilled materials, including fluoride-containing additives used in the sand molds and fluoride-containing fluxes. Fluoride concentrations in samples collected from the leachate piezometers range from 91 to 120 mg/l dissolved fluoride and 310 to 410 mg/l total fluoride (**Table 8**). Based on this information and the "clean" upgradient well, the landfill appears to be the primary source of elevated fluoride in the groundwater. If hydrofluoric acid was discharged to the former waste acid dump pit in the past, this could be an additional source of fluoride in groundwater, but would likely be a much smaller source than the landfill.

Sulfate exceeds the secondary MCL at many of the site monitoring wells, due at least in part to high natural background levels. Both upgradient and downgradient from the landfill, sulfate levels are significantly higher at the deeper monitoring wells than at the water table. The sulfate concentrations do not correlate well with the elevated fluoride concentrations, which are typically highest at the water table wells. At the water table, sulfate levels are higher downgradient from the landfill than at the upgradient well nest; however, for the intermediate and deep wells, the ranges of results upgradient and downgradient from the landfill are similar. These results suggest that the elevated sulfate concentrations in the deeper wells reflect natural background, not contamination from the landfill.

As part of the Final Groundwater Quality Assessment Report, H.R. Green evaluated background levels of sulfate in groundwater by sampling other monitoring wells and a shallow water supply well in the surrounding area. Background sulfate levels from these off-site wells ranged from 53 to 1,600 mg/l. Based on this information, H.R. Green suggested that sulfate levels above about 1,700 mg/l might be due to landfill influences.

Although we concur that the landfill may be contributing sulfate to the groundwater, we believe that the approach of setting a cut-off level above which landfill impacts are suspected is flawed. The range of sulfate concentrations in samples collected from the leachate piezometers was 860 to 1,400 mg/l. These levels are lower than the upgradient sulfate concentrations, so it is not possible for leachate with these sulfate concentrations to increase sulfate levels at depth or cause sulfate concentrations above 1,700 mg/l. However, it is possible for the leachate to increase sulfate concentrations near the water table, which appears to be occurring at the downgradient shallow monitoring wells MW11, MW13, MW16, and MW17. These wells also show fluoride concentrations above background suggesting the groundwater quality at these wells is influenced by the landfill.

In summary, it appears that shallow groundwater downgradient from the landfill has elevated fluoride and sulfate levels due to the landfill. Deeper groundwater upgradient and downgradient from the landfill has elevated sulfate that is most likely due to natural background.

5.4 Chlorinated Solvents in Soil and Groundwater (AOC A)

Chlorinated solvents were detected in soil and groundwater at the facility during voluntary site assessment sampling completed in January and February 1998. The assessment included soil and groundwater sampling for VOCs at a variety of locations selected by WDC. The soil and groundwater samples were collected by BT^2 through geoprobe soil borings. The soil VOC analytical results for this sampling are presented in **Table 10** and on **Figure 5**. Groundwater VOC analytical results are presented in **Table 11** and on **Figure 6**. Soil boring logs are included in **Appendix D** and analytical laboratory reports are provided in **Appendix J**.

The 1998 site assessment sampling indicated that PCE contamination, as well as associated breakdown product contamination, exists in the site soil and groundwater in the vicinity of the PCE AST, and also near the northwest corner of the main site building. Chlorinated VOCs detected in soil and/or groundwater include PCE, trichloroethylene, 1,1-dichloroethylene, 1,2-dichloroethylene, vinyl chloride, and other chlorinated compounds. The five listed VOCs were all detected in groundwater at concentrations exceeded their respective MCLs. The maximum PCE concentration was 34,000

micrograms per liter (µg/l) (34 mg/l) in a sample collected immediately east of the PCE AST. This concentration is within the range that may be associated with the presence of a non-aqueous phase liquid (NAPL), because it is greater than 10% of the solubility of PCE. The PCE AST is no longer in use since the replacement of the old vapor degreaser in late 2000.

Potential sources of the chlorinated solvents detected in the 1998 sampling include the leaks or spills associated with the PCE AST; leaks from the former vapor degreaser, which was in a concrete pit in the building (see **Figure 2**); or leaks or spills during management of PCE products or spent PCE. The RFA noted that spent PCE had formerly been stored near the chromic acid AST and chlorinated VOCs were detected in this general area.

The known PCE spill at the PCE AST occurred on September 1, 1998, after the 1998 sampling was completed, so any contamination related to the spill is not reflected in the soil and groundwater results shown on **Figures 5** and **6**. The spill occurred near the AST and product flowed east across the parking lot to the center curb, then north along the curb to a point where is was dammed by WDC personnel. This area is within the area where PCE contamination was detected in the 1998 sampling.

The extent of chlorinated solvent contamination in soil and groundwater has not been determined by the sampling to date; however, concentrations appear to decrease with distance from the likely sources. The dense, non-weathered till observed in the deeper borings at the landfill probably limits or reduce downward vertical migration. Additional sampling will be needed as part of the RFI to evaluate the nature and extent of chlorinated solvent contamination and evaluate potential exposure pathways and associated risk.

5.5 Petroleum ASTs (AOC B)

A soil sample collected in the petroleum AST area during the 1998 site assessment contained 40 micrograms per kilogram (µg/kg) benzene, indicating a potential petroleum release; however, a groundwater sample from the same area did not contain detectable benzene or other petroleum compounds. The soil VOC analytical results for this sampling are presented in **Table 10** and on **Figure 5**. Groundwater VOC analytical results are presented in **Table 11** and on **Figure 6**. Soil boring logs are included in **Appendix D** and analytical laboratory reports are provided in **Appendix J**.

Although these results suggest that the extent of contamination associated with petroleum releases in the AST area is limited, some additional sampling is needed to determine the extent.

6.0 PRELIMINARY CONCEPTUAL SITE RISK MODEL

6.1 Potential Receptors

Potential receptors for contamination from the releases at the facility can be characterized as follows:

Industrial Workers: Approximately 211 employees are currently employed at the WDC facility. The facility is served by City water; so industrial workers are not exposed to groundwater. Most work is done inside the facility buildings. Industrial workers are also present at other businesses in the industrial park.

Construction Workers: Construction workers could potentially be short-term receptors if a construction project involved excavation in areas of soil or groundwater contamination.

Trespassers: Trespassers are not likely to be receptors of on-site contamination because all operational areas of the facility are surrounded by a chain link fence with angled barbed wire at the top and a security guard is on duty at all times. Only parking lots, grass lawn areas, farmed land, and the soil borrow area are outside of the fence.

Residents: Residents are located south and east of the facility, where the land use is primarily agricultural with farm homes. The closest residence is located approximately 600 feet southeast of the southeast property corner. Residences south and east of the facility obtain water from private wells. There are no residences between the facility and the Middle Platte River, which may serve as a discharge point for shallow groundwater.

Terrestrial Biota: On-site terrestrial biota are limited due to the industrial land use. Off-site biota are strongly influenced by the agricultural land use.

Aquatic Biota: There are no water bodies to support aquatic biota on site. Off site, the Middle Platte River is located approximately 550 feet southeast of the southeast corner of the facility property. At this location, the Middle Platte River is a small channel that appears to have been straightened by excavation to serve as an agricultural drainage ditch.

6.2 Transport Mechanisms and Media Pathways

Transport mechanisms and media pathways that may be active at the WDC site are summarized on **Figure 7** in a conceptual site risk model flow chart format. The site-specific characteristics of each

transport mechanism-media pathway combination are discussed briefly below, with more SWMU-specific information provided in **Section 6.3**.

Soil direct contact: Soil contamination appears to be contained to the site, so this pathway is applicable only for on-site receptors. Some of the contamination is below concrete, asphalt, or clean fill, eliminating the potential for direct contact.

Leaching to groundwater and groundwater transport: The water table is at a depth of approximately 10 to 15 feet at the site. Sampling indicates that contamination has reached the groundwater in the waste acid AST area, the landfill area, and the solvent release area(s). Groundwater flow is to the southeast. The hydraulic conductivity in the shallow alluvium and weathered till is moderately low (on the order of 10^{-5} cm/sec) and the deeper unweathered till below about 23 feet has a very low hydraulic conductivity (on the order of 10^{-7} cm/sec). Shallow groundwater likely discharges to the Middle Platte River southeast of the site; however, based on the hydraulic conductivity data is appears unlikely that contamination from the site would have traveled this far.

Stormwater and surface water: Stormwater from the active areas of the site leaves the site via a culvert under Osage Street just north of the east driveway. From this point, stormwater follows a ditch that ultimately discharges to the Middle Platte River, located approximately 550 feet southeast of the southeast property corner. As noted above, groundwater from the site could also ultimately discharge to the Middle Platte River. Near the site, the river appears to have been straightened by excavation to serve as an agricultural drainage ditch. It appears to be too small for significant recreational use and it is not a drinking water source for humans.

Sediment: The sediment media pathway is closely linked to the stormwater and surface water pathway and the potential exposure points share the same locations.

Volatilization and enclosed space accumulation: Volatilization is a migration pathway only for the VOC releases at the site. The potential for enclosed space accumulation appears to be low because the site buildings do not have basements and have good ventilation systems in place. This pathway would be significant for off-site residents only if VOC contamination in groundwater extended to a residence, which appears unlikely.

Plant uptake: Plant uptake does not appear likely to be a significant pathway. Soil contamination appears to be limited to the site and some of the contaminated soil is below concrete, asphalt, or clean fill. On-site vegetation is limited to grass and is not a food source for humans.

6.3 Potential Exposure Pathways

The currently available information on the nature and extent of contamination, potential receptors, transport mechanisms, and media pathways provides a good basis for a preliminary analysis of potentially complete exposure pathways for contamination related to the SWMUs and AOCs. Potential exposure pathways for the facility are shown in a conceptual site risk model flow chart format on **Figure 7**. Potential exposure pathways specific to each SWMU or AOC identified for further investigation are shown on **Figures 8** through **12**.

6.3.1 Conceptual Site Risk Model Summary

The summary site risk model (**Figure 7**) shows the relationships between primary sources, secondary sources, transport mechanisms, and exposure routes that may be active at this site. The right-most two columns on **Figure 7** show the potential receptors for each media pathway. The potential receptor groups shown are those for which the media pathway either is known to be potentially complete based on the existing data (first column) or cannot be determined to be incomplete based on the existing data (second column). Not all pathways are complete for all potential sources or all receptors. The potential receptors shown on **Figure 7** are the summary of those shown for each SWMU and/or AOC on **Figures 8** through **12**.

Some of the key assumptions incorporated in the exposure pathway analysis for all sources include the following:

1) Land use at the facility is currently industrial and will remain so in the foreseeable future.
2) Trespassers do not need to be considered as on-site receptors because the active areas of the site are fenced and a security guard is on duty at all times.
3) Soil contamination does not extend off site (based on current data).
4) Plant uptake is not a significant concern because much of the soil contamination is below pavement, the limited on-site vegetation is not a food source for humans, and terrestrial biota on site are limited due to the industrial activities.
5) NAPL is a potential secondary source only for the chlorinated solvent contamination (AOC A).

6) Volatilization and enclosed space accumulation are potential transport mechanisms for the chlorinated VOCs and petroleum release only (AOCs A and B), because the other potential contaminants at the site are inorganic and non-volatile.

6.3.2 Former Chromic Acid AST/Dump Pit Area (SWMUs 4 and 11)

The exposure pathway evaluation for the former chromic acid AST and waste acid dump pit areas is shown graphically on **Figure 8**. The preliminary determination of whether each pathway is completed is shown on the figure using the following denotations:

- "P" indicates that the pathway is potentially complete based on the existing data. For example, the waste acid AST-soil-construction worker pathway appears to be potentially complete because there is known soil contamination to which a construction worker could be exposed if an excavation were performed in the contaminated area.

- "?" indicates that the pathway cannot be determined to be complete or incomplete based on the existing data. For example, it appears unlikely that the waste acid AST-groundwater-resident pathway is complete, but additional data are needed to confirm the extent of the chromium contamination in groundwater before this pathway can be conclusively determined to be incomplete.

- "N" indicates that the pathway does not appear to be complete based on the existing data. For example, the waste acid AST-groundwater-industrial worker pathway is not complete because the facility is served by City water.

For the former waste acid AST and acid dump pit area, potentially complete pathways include the following:

- Direct contact with contaminated soil or groundwater by a construction worker, if excavation were performed within the contaminated area.

Pathways that require additional information to determine if they are complete and the information needed to make the determination include the following:

- Residential exposure to groundwater (off site)
    - Although it appears unlikely that chromium in groundwater extends off site, this needs to be confirmed.

- Exposure of terrestrial or aquatic biota to surface water or sediment (off site)
    - Although it appears unlikely that chromium in groundwater or stormwater runoff extends off site to the Middle Platte River, this needs to be confirmed.

Pathways that do not appear to be complete and the reasons for this determination include the following:

- Direct contact with contaminated soil or contact with windblown dust by a resident, industrial worker, or trespasser, or by terrestrial or aquatic biota
    - Soil contamination is below clean fill and/or concrete driveway.
    - Soil contamination does not appear to extend off site to residential areas.
    - Site access control (fence and security guard) prevents trespassers.

- Groundwater exposure by industrial worker
    - The facility is served by City water and groundwater is not near the ground surface.

- Surface water or sediment exposure by human receptors
    - The Middle Platte River is not a drinking water source and does not appear likely to have significant recreational use.

6.3.3 Magnesium Dross Storage and Treatment (SWMUs 8 and 9)

The exposure pathway evaluation for the magnesium dross storage and treatment areas is shown graphically on **Figure 9**. For these areas, potentially complete pathways include the following:

- Direct contact with contaminated soil or windblown dust by a construction worker or industrial worker

Although these pathways are potentially complete, the associated risk is likely very low. A sample of the untreated dross collected during the RFA had a barium concentration that was less than the Soil Screening Level based on a residential exposure scenario.

Pathways that require additional information to determine if they are complete and the information needed to make the determination include the following:

- Residential exposure to groundwater (off site)
    - Although the RFA sampling indicated barium was below the MCL in the landfill wells, this needs to be confirmed based on current conditions.

- Exposure of terrestrial biota to soil, windblown dust, or plant uptake
    - Dross storage and treatment areas are primarily on either concrete or landfill areas, where biota are not generally present; however, these pathways cannot be excluded until the extent of any surface soil contamination is defined.

- Exposure of terrestrial or aquatic biota to surface water or sediment (off site)
    - Although it appears unlikely that chromium in groundwater or stormwater runoff extends off site to the Middle Platte River, this needs to be confirmed.

Pathways that do not appear to be complete and the reasons for this determination include the following:

- Direct contact with contaminated soil or contact with windblown dust by a resident or trespasser, or by aquatic biota
    - Soil contamination does not appear to extend off site to residential areas or areas with aquatic biota.
    - Site access control (fence and security guard) prevents trespassers.

- Groundwater exposure by an industrial worker
    - The facility is served by City water and groundwater is not near the ground surface.

- Surface water or sediment exposure by human receptors
    - The Middle Platte River is not a drinking water source and does not appear likely to have significant recreational use.

As noted previously, the RFI will address only the portion of SWMU 8 that is not located within the limits of investigation of the former thorium burial area that is being investigated under the authority of the IDPH.

6.3.4 Landfill Groundwater Impacts (SWMU 12)

The exposure pathway evaluation for the landfill groundwater impacts is shown graphically on **Figure 10**. For the groundwater impacts related to this SWMU, the only potentially complete pathway based on the existing information is potential dermal contact with groundwater by a construction worker. For this SWMU, only the pathways that start with groundwater contamination were evaluated because other pathways are addressed via the IDNR landfill permit rather than the RFI.

Pathways that require additional information to determine if they are complete and the information needed to make the determination include the following:

- Residential exposure to groundwater (off site)
    - Although H.R. Green estimated based on modeling that groundwater contamination related to the landfill extends only a short distance beyond the existing monitoring wells, this needs to be confirmed.

- Exposure of terrestrial or aquatic biota to surface water or sediment (off site)
    - Although it appears unlikely that groundwater impacts extend off site to the Middle Platte River, where terrestrial or aquatic biota could be affected, this needs to be confirmed.

Pathways that do not appear to be complete and the reasons for this determination include the following:

- Groundwater exposure by industrial workers or construction workers
    - The facility is served by City water and groundwater is not near the ground surface.

- Surface water or sediment exposure by human receptors
    - The Middle Platte River is not a drinking water source and does not appear likely to have significant recreational use.

6.3.5 Chlorinated VOC and Petroleum Releases (AOCs A and B) and Waste Methanol Drum Storage Area (SWMU 7)

The exposure pathway evaluation for the potential VOC release areas, including the chlorinated solvent and petroleum releases areas and the waste methanol drum storage area, is shown graphically on **Figure 11**. For these areas, potentially complete pathways include the following:

- Direct contact with contaminated soil or groundwater by a construction worker, if excavation were performed in the contaminated area
- Inhalation of soil vapor by a construction worker, if excavation were performed in the contaminated area

Pathways that require additional information to determine if they are complete and the information needed to make the determination include the following:

- Residential exposure to groundwater (off site)
    - Although it appears unlike based on the existing groundwater sampling results that groundwater contamination by VOCs extends off site, this needs to be confirmed.

- Exposure of terrestrial or aquatic biota to surface water or sediment (off site)
    - Although it appears unlikely that groundwater impacts extend off site to the Middle Platte River, where terrestrial or aquatic biota could be affected, this needs to be confirmed.

- Exposure of industrial workers or residents to soil vapor
    - The potential for industrial worker exposure to soil vapor is probably low, but needs to be evaluated after the extent of VOC contamination is determined.
    - Off-site residents would be potentially exposed to soil vapor only if the groundwater contamination plume extends off site to a residence. This appears unlikely but needs to be confirmed.

Pathways that do not appear to be complete and the reasons for this determination include the following:

- Direct contact with contaminated soil by a resident, industrial worker, or trespasser, or by terrestrial or aquatic biota
    - Soil contamination appears to be mainly below pavement and VOCs will not remain in shallow surface soils due to volatilization.
    - Soil contamination does not appear to extend off site to residential areas.
    - Site access control (fence and security guard) prevents trespassers.

- Groundwater exposure by industrial workers
    - The facility is served by City water and groundwater is not near the ground surface.

- Surface water or sediment exposure by human receptors
    - The Middle Platte River is not a drinking water source and does not appear likely to have significant recreational use.

6.3.6 Wastewater Treatment System and Waste Acid Collection Pit (SWMUs 6 and 10)

The exposure pathway evaluation for the wastewater treatment system and waste acid collection pit is shown graphically on **Figure 12**. For these two SWMUs, no release to the environment has been documented, so there are no exposure pathways that appear to be complete based on the existing information. If a release has occurred from one of these SWMUs, the migration pathway would be limited to soil leaching to groundwater. The other pathways are eliminated because the potential release location is under the building and the contaminants of concern are not volatile. Because there is no on-site use of groundwater, the possible receptors if a release has occurred would be off-site residents, if groundwater contamination extended off site, and/or biota exposed to surface water or sediment if groundwater contamination extended to the Middle Platte River. Based on the site geology, it appears unlikely that these pathways would be complete even if a release has occurred.

6.3.7 Current Wastewater Treatment Sludge Storage Area (SWMU 2)

There is currently no information to suggest that a release has occurred from the current wastewater treatment sludge storage area (SWMU 2). If the RFI sampling indicates a potential release, the exposure pathway evaluation for the current wastewater treatment sludge storage area would be similar to that for the magnesium dross storage and treatment areas (**Figure 9**).

7.0 INTERIM CORRECTIVE ACTION MEASURES

7.1 SWMU 4 and 11 Removal Actions

The original objective of the removal actions performed in the area of the former chromic acid AST and waste acid dump pit was to achieve RCRA closure of the chromic acid AST. Although closure was not achieved due to remaining chromium contamination in soil and groundwater, these activities have functioned as an interim corrective action measure for SWMUs 4 and 11 by removing the source area.

The Closure Certification Report (H.R. Green, 1994) documents the removal actions, including the following:

- Cleaning and removal of the chromic acid AST (April 7 and June 18, 1993)
- Initial excavation of 75 cubic yards of soil from the AST area (December 14-15, 1993)
- Removal of the former waste acid dump pit and additional soil, with a total of 20 cubic yards of concrete and 154 cubic yards of additional soil removed (June 14-17, 1994)

Soil samples were collected before, during, and after the excavations to evaluate the extent of chromium contamination. Four monitoring wells were also installed and sampled. The results of the soil and groundwater sampling and the current extent of contamination are discussed in **Section 5.1**.

7.2 Need for Additional Interim Corrective Action Measures

Based on the assessment of current exposure risk, no additional interim corrective action measures appear to be warranted.

8.0 REFERENCES

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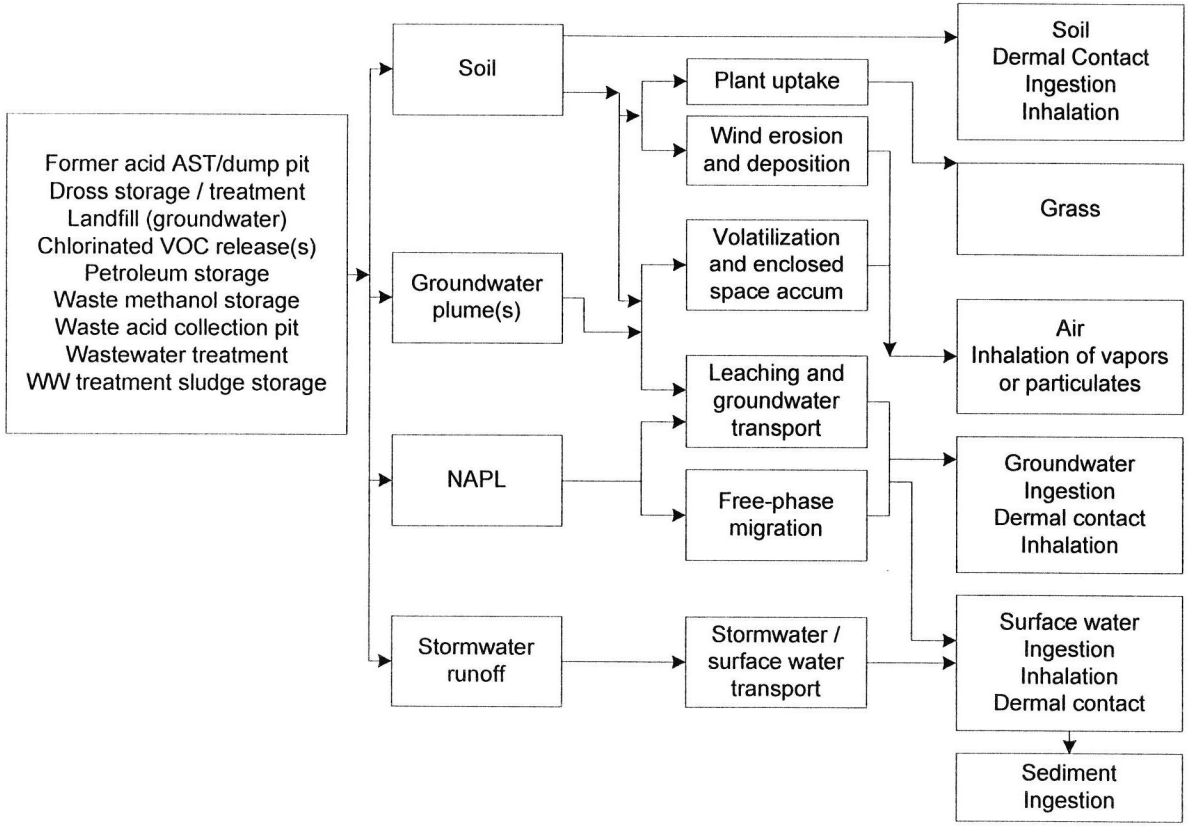
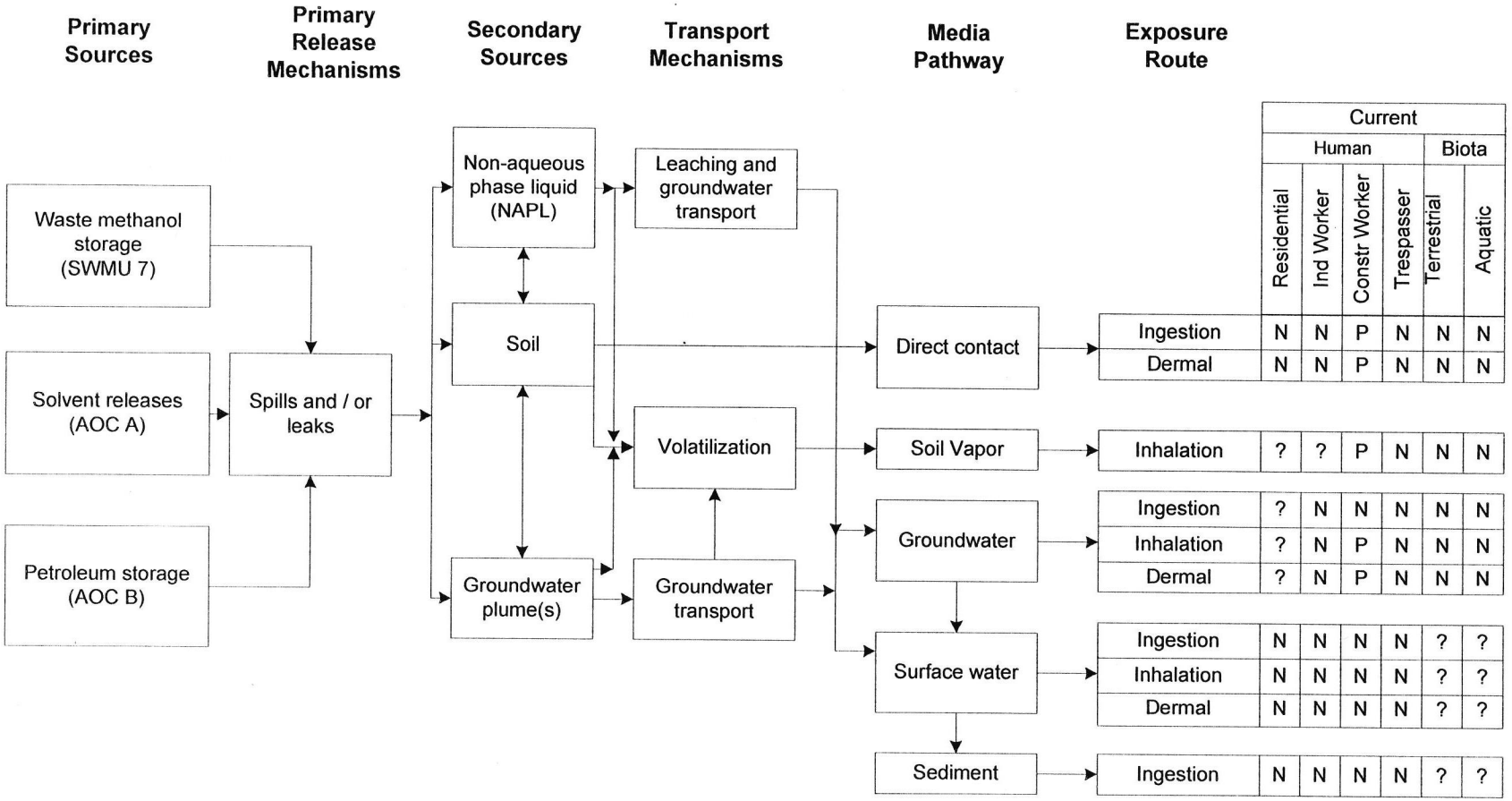
FIGURES

Figure 7
Potential Exposure Pathway Summary
Wellman Dynamics, Creston, Iowa



Potential Receptors Based on Current Data	Receptors with Additional Information Needed
• Industrial • Construction worker	• Residential • Terrestrial Biota
• None	• Terrestrial Biota
• Construction worker	• Residential • Industrial
• Construction worker	• Residential
• None	• Aquatic biota • Terrestrial biota
• None	• Aquatic biota • Terrestrial biota

Figure 11
Exposure Pathway Evaluation
Chlorinated VOC and Petroleum Releases (AOCs A&B) and Waste Methanol Drum Storage Area (SWMU 7)
Wellman Dynamics, Creston, Iowa

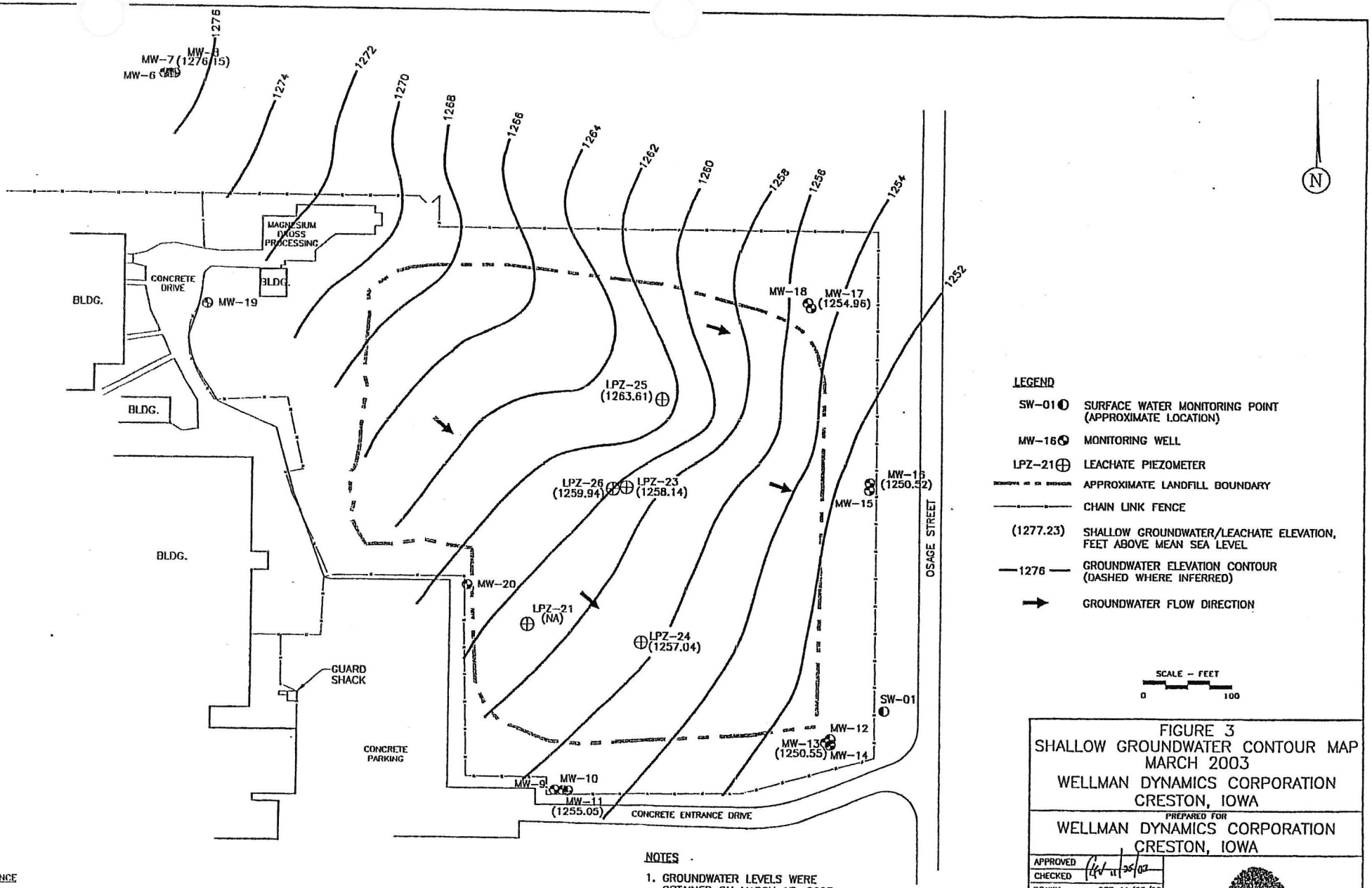


		Current						
		Human				Biota		
		Residential	Ind Worker	Constr Worker	Trespasser	Terrestrial	Aquatic
Direct contact	Ingestion	N	N	P	N	N	N
	Dermal	N	N	P	N	N	N
Soil Vapor	Inhalation	?	?	P	N	N	N
Groundwater	Ingestion	?	N	N	N	N	N
	Inhalation	?	N	P	N	N	N
	Dermal	?	N	P	N	N	N
Surface water	Ingestion	N	N	N	N	?	?
	Inhalation	N	N	N	N	?	?
	Dermal	N	N	N	N	?	?
Sediment	Ingestion	N	N	N	N	?	?

N - Pathway not completed.
? - Pathway completion not known.
P - Pathway potentially completed.

APPENDIX C

Hydrogeologic Investigation Report (text only) and
Shallow Groundwater Contour Maps



REFERENCE

TAKEN FROM GREEN ENVIRONMENTAL SERVICES, INC. "HYDROGEOLOGIC INVESTIGATION REPORT" JANUARY 25, 1993.

NOTES

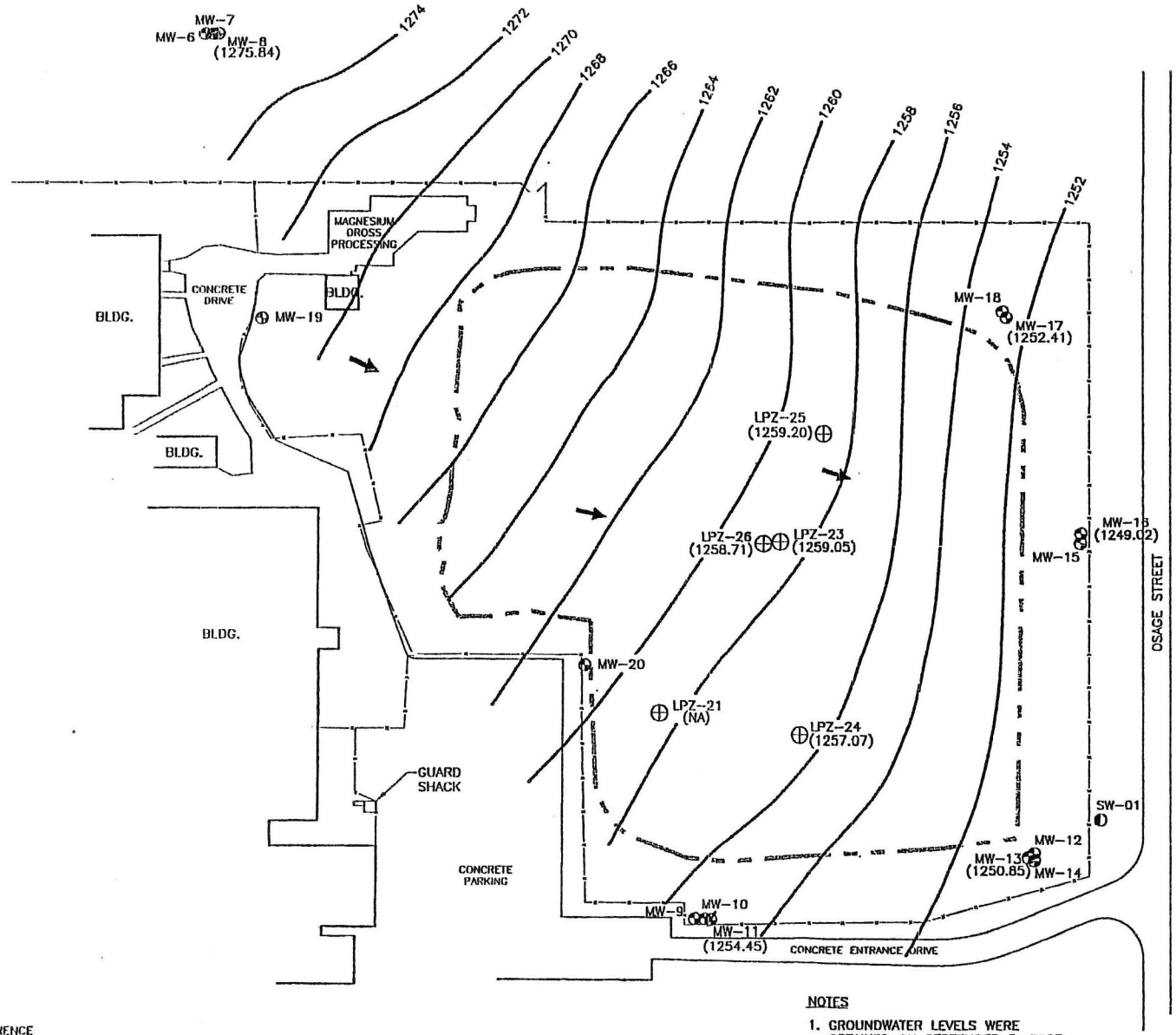
1. GROUNDWATER LEVELS WERE OBTAINED ON MARCH 17, 2003.
2. NA – NOT AVAILABLE.

FIGURE 3
SHALLOW GROUNDWATER CONTOUR MAP
MARCH 2003
WELLMAN DYNAMICS CORPORATION
CRESTON, IOWA

PREPARED FOR
WELLMAN DYNAMICS CORPORATION
CRESTON, IOWA

APPROVED	
CHECKED	11/25/03
DRAWN	DEB 11/25/03
DRAWING NUMBER	4764229

Earth Sciences Consultants, Inc.



LEGEND

- SW-01 — SURFACE WATER MONITORING POINT (APPROXIMATE LOCATION)
- MW-16 — MONITORING WELL
- LPZ-21 — LEACHATE PIEZOMETER
- APPROXIMATE LANDFILL BOUNDARY
- CHAIN LINK FENCE
- (1277.23) — SHALLOW GROUNDWATER/LEACHATE ELEVATION, FEET ABOVE MEAN SEA LEVEL
- —1276— GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION

SCALE – FEET
0 100

NOTES

1. GROUNDWATER LEVELS WERE OBTAINED ON SEPTEMBER 5, 2003.
2. NA – NOT AVAILABLE.

REFERENCE

TAKEN FROM GREEN ENVIRONMENTAL SERVICES, INC. "HYDROGEOLOGIC INVESTIGATION REPORT" JANUARY 25, 1993.

FIGURE 4
SHALLOW GROUNDWATER CONTOUR MAP SEPTEMBER 2003
WELLMAN DYNAMICS CORPORATION CRESTON, IOWA

PREPARED FOR
WELLMAN DYNAMICS CORPORATION
CRESTON, IOWA

APPROVED	
CHECKED	11/25/03
DRAWN	DEB 11/25/03
DRAWING NUMBER	4764230

Earth Sciences Consultants, Inc.